



UTILITY PATENT APPLICATION TRANSMITTAL

Only for new nonprovisional applications under 37 CFR 1.53(b))

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First Named Inventor or Application Identifier

KITAHIRO KANEDA

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APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO:

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2. ☒ Specification Total Pages

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4. ☒ Oath or Declaration Total Pages

a. ☒ Newly executed (original or copy)

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c. ☐ Copy from a prior application (37 CFR 1.63(d))
(for continuation/divisional with Box 17 completed)
[Note Box 5 below]

i. ☐ **DELETION OF INVENTOR(S)**
Signed Statement attached deleting
inventor(s) named in the prior application,
see 37 CFR 1.63(d)(2) and 1.33(b).

5. ☐ Incorporation By Reference (useable if Box 4c is checked)
The entire disclosure of the prior application, from which a copy of
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ACCOMPANYING APPLICATION PARTS

8. ☒ Assignment Papers (cover sheet & document(s))

9. ☐ 37 CFR 3.73(b) Statement (when there is an assignee) ☒ Power of Attorney

10. ☐ English Translation Document (if applicable)

11. ☐ Information Disclosure Statement (IDS)/PTO-1449 ☐ Copies of IDS Citations

12. ☐ Preliminary Amendment

13. ☒ Return Receipt Postcard (MPEP 503)
(Should be specifically itemized)

14. ☐ Small Entity Statement(s) ☐ Statement filed in prior application
Status still proper and desired

15. ☐ Certified Copy of Priority Document(s)
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CLAIMS	(1) FOR	(2) NUMBER FILED	(3) NUMBER EXTRA	(4) RATE	(5) CALCULATIONS
	TOTAL CLAIMS (37 CFR 1.16(c))	78-20 =	58	X \$ 18.00 =	\$1044.00
	INDEPENDENT CLAIMS (37 cfr 1.16(b))	18-3 =	15	X \$ 78.00 =	\$1170.00
	MULTIPLE DEPENDENT CLAIMS (if applicable) (37 CFR 1.16(d))			\$260.00 =	\$ -
				BASIC FEE (37 CFR 1.16(a))	\$ 760.00
	Total of above Calculations =				\$2974.00
	Reduction by 50% for filing by small entity (Note 37 CFR 1.9, 1.27, 1.28).				-
	TOTAL =				\$2974.00

19. Small entity status

- a. ☐ A Small entity statement is enclosed
- b. ☐ A small entity statement was filed in the prior nonprovisional application and such status is still proper and desired.
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20. ☒ A check in the amount of \$ 2974.00 to cover the filing fee is enclosed.

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- a. ☒ Fees required under 37 CFR 1.16.
- b. ☐ Fees required under 37 CFR 1.17.
- c. ☐ Fees required under 37 CFR 1.18.

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED	
NAME	David L. Schaeffer, RN 32,716
SIGNATURE	David L. Schaeffer
DATE	December 15, 1998

TITLE OF THE INVENTION

COMMUNICATION SYSTEM AND CONTROL METHOD THEREOF, AND
COMPUTER-READABLE MEMORY

BACKGROUND OF THE INVENTION

5 The present invention relates to a communication system, which performs communication between a terminal and a central control unit, and a control method thereof, and computer-readable memory.

10 Generally speaking, a terminal having a character recognition unit transfers the result of character recognition in the terminal to a central control unit, and the central control unit performs post-processing such as error correction, search, and storage of the result of character recognition. At this time, if the
15 terminal judges that the accuracy of a candidate for character recognition is low, the terminal informs the central control unit of being unrecognizable by sending a predetermined identifier (hereinafter, this is called a rejection code) to the central control unit as the
20 candidate for character recognition being unrecognizable.

 As for the rejection code, probability (hereinafter, this is called similarity) of each recognition candidate character is calculated, and if it
25 is lower than a predetermined threshold, it is judged that the character is unrecognizable. Therefore, as

shown in Fig. 17, generally speaking, if frequency of the rejection code (hereinafter, this is called a rejection ratio) is high, that is, if a threshold of the similarity is high, the similarity of the character that is judged to be recognizable becomes relatively high and its correct solution ratio becomes also high. On the contrary, if the rejection ratio is low, the correct solution ratio of the character is apt to be low even if it is judged that the character is recognizable.

Nevertheless, in a communication system that performs communication between the conventional terminal and central control unit, the rejection ratio is inherent, that is, the threshold of the similarity is fixed. Owing to this, for example, if the rejection ratio varies due to a state change of character recognition in each terminal, the central control unit can treat nothing against that, and hence it is inevitable that efficiency of post-processing decrease.

SUMMARY OF THE INVENTION

The present invention is invented in consideration of the above problems, and an object thereof is to provide a communication system and a control method thereof, which increase processing efficiency in a communication system that performs communication between a terminal, performing character recognition, and a

central control unit, and computer-readable memory.

A communication system according to the present invention for achieving the above object comprises the following construction. Thus, the communication system
5 performs communication between a terminal and a central control unit, the terminal comprising:

read means for reading a manuscript as image data;
character recognition means for performing
character recognition from the image data, read by the
10 read means, on the basis of a control signal; and

first communication means for transmitting a result of character recognition in the character recognition means to the central control unit or receiving the control signal from the central control unit;

15 the central control unit comprising:

second communication means for receiving the result of character recognition in the character recognition means from the terminal or transmitting the control signal to the terminal; and

20 control means for controlling the control signal on the basis of the result of character recognition in the character recognition means, which the second communication means receives.

A control method for a communication system
25 according to the present invention for achieving the above object comprises the following construction. Thus,

the control method is for a communication system that performs communication between a terminal and a central control unit, the control method comprising:

a read step of reading a manuscript as image data;

5 a character recognition step of performing character recognition from the image data, read at the read step, on the basis of a control signal;

a first communication step of transmitting a result of character recognition at the character recognition
10 step to the central control unit or receiving the control signal from the central control unit;

a second communication step of receiving the result of character recognition at the character recognition step from the terminal or transmitting the control
15 signal to the terminal; and

a control step of controlling the control signal on the basis of the result of character recognition at the character recognition step, which the second communication step receives.

20 Computer-readable memory according to the present invention for achieving the above object comprises the following construction. Thus, the computer-readable memory stores program code for controlling a communication system that performs communication between
25 a terminal and a central control unit, the computer-readable memory comprising:

program code for a read step of reading a
manuscript as image data;

program code for a character recognition step of
performing character recognition from the image data,
5 read at the read step, on the basis of a control signal;

program code for a first communication step of
transmitting a result of character recognition at the
character recognition step to the central control unit
or receiving the control signal from the central control
10 unit;

program code for a second communication step of
receiving the result of character recognition at the
character recognition step from the terminal or
transmitting the control signal to the terminal; and

15 program code for a control step of controlling the
control signal on the basis of the result of character
recognition at the character recognition step, which the
second communication step receives.

A communication system according to the present
20 invention for achieving the above object comprises the
following construction. Thus, the communication system
performs communication between a terminal and a central
control unit, the terminal comprising:

read means for reading a manuscript, including a
25 manuscript ID showing a kind of the manuscript, as image
data;

storage means for storing a recognition dictionary group each corresponding to an attribute of data;

character recognition means for performing character recognition from the image data, read by the

5 read means, with selecting a recognition dictionary, based on a control signal, from the recognition dictionary group stored in the storage means;

manuscript ID recognition means for recognizing the manuscript ID from the image data; and

10 first communication means for transmitting a result of character recognition in the character recognition means and a result of manuscript ID recognition in the manuscript ID recognition means to the central control unit or receiving the control signal from the central
15 control unit;

the central control unit comprising:

second communication means for receiving the result of character recognition in the character recognition means and the result of manuscript ID recognition in the
20 manuscript ID recognition means from the terminal or transmitting the control signal to the terminal; and

control means for controlling the control signal on the basis of the result of manuscript ID recognition in the manuscript ID recognition means, which the second
25 communication means receives.

A control method for a communication system

according to the present invention for achieving the
above object comprises the following construction. Thus,
the control method is for a communication system that
performs communication between a terminal and a central
5 control unit, the control method comprising:

a read step of reading a manuscript, including a
manuscript ID showing a kind of the manuscript, as image
data;

10 a character recognition step of performing
character recognition from the image data, read at the
read step, with selecting a recognition dictionary,
based on a control signal, from a recognition dictionary
group whose members each correspond to each attribute of
data;

15 a manuscript ID recognition step of recognizing the
manuscript ID from the image data;

a first communication step of transmitting a result
of character recognition at the character recognition
step and a result of manuscript ID recognition at the
20 manuscript ID recognition step to the central control
unit or receiving the control signal from the central
control unit;

a second communication step of receiving the result
of character recognition at the character recognition
25 step and the result of manuscript ID recognition at the
manuscript ID recognition step from the terminal or

transmitting the control signal to the terminal; and

a control step of controlling the control signal on the basis of the result of manuscript ID recognition at the manuscript ID recognition step, which the second
5 communication step receives.

Computer-readable memory according to the present invention for achieving the above object comprises the following construction. Thus, the computer-readable memory stores program code for controlling a
10 communication system that performs communication between a terminal and a central control unit, the computer-readable memory comprising:

program code for a read step of reading a manuscript, including a manuscript ID showing a kind of
15 the manuscript, as image data;

program code for a character recognition step of performing character recognition from the image data, read at the read step, with selecting a recognition dictionary from a recognition dictionary group whose
20 members each correspond to each attribute of data, on the basis of a control signal;

program code for a manuscript ID recognition step of recognizing the manuscript ID from the image data;

program code for a first communication step of
25 transmitting a result of character recognition at the character recognition step and a result of manuscript ID

recognition at the manuscript ID recognition step to the central control unit or receiving the control signal from the central control unit;

5 program code for a second communication step of receiving the result of character recognition at the character recognition step and the result of manuscript ID recognition at the manuscript ID recognition step from the terminal or transmitting the control signal to the terminal; and

10 program code for a control step of controlling the control signal on the basis of the result of manuscript ID recognition at the manuscript ID recognition step, which the second communication step receives.

15 A communication system according to the present invention for achieving the above object comprises the following construction. Thus, the communication system performs communication between a terminal and a central control unit, the terminal comprising:

20 read means for reading a manuscript as image data; character recognition means for performing character recognition from the image data, read by the read means, on the basis of a control signal; and

25 first communication means for transmitting a result of character recognition in the character recognition means to the central control unit or receiving the control signal from the central control unit;

the central control unit comprising:
input means for inputting the control signal; and
second communication means for receiving the result
of character recognition in the character recognition
5 means from the terminal or transmitting the control
signal, which is inputted from the input means, to the
terminal.

A control method of a communication system
according to the present invention for achieving the
10 above object comprises the following construction. Thus,
the control method is for a communication system that
performs communication between a terminal and a central
control unit, the control method comprising:

a read step of reading a manuscript as image data;
15 a character recognition step of performing
character recognition from the image data, read at the
read step, on the basis of a control signal;

a first communication step of transmitting a result
of character recognition at the character recognition
20 step to the central control unit or receiving the
control signal from the central control unit;

an input step of inputting the control signal; and
a second communication step of receiving the result
of character recognition at the character recognition
25 step from the terminal or transmitting the control
signal, which is inputted at the input step, to the

terminal.

Computer-readable memory according to the present invention for achieving the above object comprises the following construction. Thus, the computer-readable

5 memory stores program code for controlling a communication system that performs communication between a terminal and a central control unit, the computer-readable memory comprising:

program code for a read step of reading a
10 manuscript as image data;

program code for a character recognition step of performing character recognition from the image data, read at the read step, on the basis of a control signal;

program code for a first communication step of
15 transmitting a result of character recognition at the character recognition step to the central control unit or receiving the control signal from the central control unit;

program code for an input step of inputting the
20 control signal; and

program code for a second communication step of receiving the result of character recognition at the character recognition step from the terminal or transmitting the control signal, which is inputted at
25 the input step, to the terminal.

A communication system according to the present

invention for achieving the above object comprises the following construction. Thus, the communication system performs communication between a terminal and a central control unit, the terminal comprising:

5 read means for reading a manuscript, including a manuscript ID showing a kind of the manuscript, as image data;

 character recognition means for performing character recognition from the image data, read by the
10 read means, on the basis of a control signal;

 manuscript ID recognition means for recognizing the manuscript ID from the image data; and

 first communication means for transmitting a result of character recognition in the character recognition
15 means and a result of manuscript ID recognition in the manuscript ID recognition means to the central control unit or receiving the control signal from the central control unit;

 the central control unit comprising:

20 second communication means for receiving the result of character recognition in the character recognition means and the result of manuscript ID recognition in the manuscript ID recognition means from the terminal or transmitting the control signal to the terminal; and

25 control means for controlling the control signal on the basis of the result of manuscript ID recognition in

the manuscript ID recognition means, which the second communication means receives.

A control method of the communication system according to the present invention for achieving the
5 above object comprises the following construction. Thus, the control method is for a communication system that performs communication between a terminal and a central control unit, the control method comprising:

a read step of reading a manuscript, including a
10 manuscript ID showing a kind of the manuscript, as image data;

a character recognition step of performing character recognition from the image data, read at the read step, on the basis of a control signal;

15 a manuscript ID recognition step of recognizing the manuscript ID from the image data; and

a first communication step of transmitting a result of character recognition at the character recognition step and a result of manuscript ID recognition at the
20 manuscript ID recognition step to the central control unit or receiving the control signal from the central control unit;

a second communication step of receiving the result of character recognition at the character recognition
25 step and the result of manuscript ID recognition at the manuscript ID recognition step from the terminal or

transmitting the control signal to the terminal; and

a control step of controlling the control signal on the basis of the result of manuscript ID recognition at the manuscript ID recognition step, which the second
5 communication step receives.

Computer-readable memory according to the present invention for achieving the above object comprises the following construction. Thus, the computer-readable memory stores program code for controlling a

10 communication system that performs communication between a terminal and a central control unit, the computer-readable memory comprising:

program code for a read step of reading a manuscript, including a manuscript ID showing a kind of
15 the manuscript, as image data;

program code for a character recognition step of performing character recognition from the image data, read at the read step, on the basis of a control signal;

program code for a manuscript ID recognition step
20 of recognizing the manuscript ID from the image data;
and

program code for a first communication step of transmitting a result of character recognition at the character recognition step and a result of manuscript ID
25 recognition at the manuscript ID recognition step to the central control unit or receiving the control signal

from the central control unit;

program code for a second communication step of receiving the result of character recognition at the character recognition step and the result of manuscript

5 ID recognition at the manuscript ID recognition step from the terminal or transmitting the control signal to the terminal; and

program code for a control step of controlling the control signal on the basis of the result of manuscript

10 ID recognition at the manuscript ID recognition step, which the second communication step receives.

A communication system according to the present invention for achieving the above object comprises the following construction. Thus, the communication system

15 performs communication between a terminal and a central control unit, the terminal comprising:

read means for reading a manuscript as image data;

character recognition means for dividing the image data, read by the read means, into recognition areas

20 each having the same attribute and performing character recognition on the basis of a control signal

corresponding to each recognition area being divided;

and

first communication means for transmitting

25 positional information, showing the recognition areas respectively, and a result of character recognition

every recognition area to the central control unit or receiving the control signal from the central control unit;

the central control unit comprising:

5 second communication means for receiving the positional information, showing the recognition areas respectively, and the result of character recognition every recognition area from the terminal or transmitting the control signal to the terminal; and

10 control means for controlling the control signal every recognition area on the basis of the positional information, showing the recognition areas respectively, and the result of character recognition every recognition area, which the second communication means
15 receives.

A control method of the communication system according to the present invention for achieving the above object comprises the following construction. Thus, the control method is for a communication system that
20 performs communication between a terminal and a central control unit, the control method comprising:

a read step of reading a manuscript as image data;
a character recognition step of dividing image data, read at the read step, into recognition areas each
25 having the same attribute and performing character recognition on the basis of a control signal

corresponding to each recognition area being divided;

5 a first communication step of transmitting
positional information, showing the recognition areas
respectively, and a result of character recognition
every recognition area to the central control unit or
receiving the control signal from the central control
unit;

10 a second communication step of receiving the
positional information, showing the recognition areas
respectively, and the result of character recognition
every recognition area from the terminal or transmitting
the control signal to the terminal; and

15 a control step of controlling the control signal
every recognition area on the basis of the positional
information, showing the recognition areas respectively,
and the result of character recognition every
recognition area, which the second communication step
receives.

20 Computer-readable memory according to the present
invention for achieving the above object comprises the
following construction. Thus, the computer-readable
memory stores program code for controlling a
communication system that performs communication between
a terminal and a central control unit, the computer-
25 readable memory comprising:

program code for a read step of reading a

manuscript as image data;

program code for a character recognition step of
dividing the image data, read at the read step, into
recognition areas each having the same attribute and
5 performing character recognition on the basis of a
control signal corresponding to each recognition area
being divided;

program code for a first communication step of
transmitting positional information, showing the
10 recognition areas respectively, and a result of
character recognition every recognition area to the
central control unit or receiving the control signal
from the central control unit;

program code for a second communication step of
15 receiving the positional information, showing the
recognition areas respectively, and the result of
character recognition every recognition area from the
terminal or transmitting the control signal to the
terminal; and

20 program code for a control step of controlling the
control signal every recognition area on the basis of
the positional information, showing the recognition
areas respectively, and the result of character
recognition every recognition area, which the second
25 communication step receives.

A communication system according to the present

invention for achieving the above object comprises the following construction. Thus, the communication system performs communication between a terminal and a central control unit, the terminal comprising:

5 read means for reading a manuscript as image data;
 character recognition means for performing
character recognition from the image data read by the
read means; and

 first communication means for transmitting a result
10 of character recognition in the character recognition
means to the central control unit;

 the central control unit comprising:

 second communication means for receiving the result
of character recognition in the character recognition
15 means from the terminal;

 display means for displaying the result of
character recognition in the character recognition
means, which the second communication means receives;

 input means for inputting an instruction for
20 performing processing of the result of character
recognition; and

 post-processing means for performing post-
processing of the result of character recognition on the
basis of the input with the input means.

25 A control method of the communication system
according to the present invention for achieving the

above object comprises the following construction. Thus,
the control method is for a communication system that
performs communication between a terminal and a central
control unit, the control method comprising:

5 a read step of reading a manuscript as image data;

 a character recognition step of performing
character recognition from the image data read at the
read step;

 a first communication step of transmitting a result
10 of character recognition at the character recognition
step to the central control unit;

 a second communication step of receiving the result
of character recognition at the character recognition
step from the terminal;

15 a display step for displaying the result of
character recognition at the character recognition step,
which is received at the second communication step;

 an input step of inputting an instruction for
performing processing of the result of character
20 recognition; and

 a post-processing step for performing post-
processing of the result of character recognition on the
basis of the input at the input step.

Computer-readable memory according to the present
25 invention for achieving the above object comprises the
following construction. Thus, the computer-readable

memory stores program code for controlling a communication system that performs communication between a terminal and a central control unit, the computer-readable memory comprising:

5 program code for a read step of reading a manuscript as image data;

 program code for a character recognition step of performing character recognition from the image data read at the read step;

10 program code for a first communication step of transmitting a result of character recognition at the character recognition step to the central control unit;

 program code for a second communication step of receiving the result of character recognition at the character recognition step from the terminal;

15 program code for a display step for displaying the result of character recognition at the character recognition step, which is received at the second communication step;

20 program code for an input step of inputting an instruction for performing processing of the result of character recognition; and

 program code for a post-processing step for performing post-processing of the result of character recognition on the basis of the input at the input step.

25 Other features and advantages of the present

invention will be apparent from the following
description taken in conjunction with the accompanying
drawings, in which like reference characters designate
the same or similar parts throughout the figures
5 thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated
in and constitute a part of the specification,
10 illustrate embodiments of the invention and, together
with the description, serve to explain the principles of
the invention.

Fig. 1 is a block diagram showing the construction
of a communication system of a first embodiment
15 according to the present invention;

Fig. 2 is a flow chart showing processing executed
in a character recognition block of the first embodiment
according to the present invention;

Fig. 3 is a flow chart showing processing executed
20 in a threshold controller of the first embodiment
according to the present invention;

Fig. 4 is a block diagram showing the construction
of a communication system of a second embodiment
according to the present invention;

25 Fig. 5 is a flow chart showing processing executed
in a character recognition block of the second

embodiment according to the present invention;

Fig. 6 is a flow chart showing processing executed in a recognition dictionary information setting block of the second embodiment according to the present

5 invention;

Fig. 7 is a block diagram showing the construction of a communication system of a third embodiment according to the present invention;

Fig. 8 is a block diagram showing the construction of a communication system of a fourth embodiment according to the present invention;

Fig. 9 is a flow chart showing processing executed in a character recognition block of the fourth embodiment according to the present invention;

Fig. 10 is a flow chart showing processing executed in a threshold controller of the fourth embodiment according to the present invention;

Fig. 11 is a block diagram showing the construction of a communication system of a fifth embodiment according to the present invention;

Fig. 12 is a flow chart showing processing executed in a character recognition block of the fifth embodiment according to the present invention;

Fig. 13 is a flow chart showing processing executed in a threshold controller of the fifth embodiment according to the present invention;

Fig. 14 is a block diagram showing the construction of a communication system of a sixth embodiment according to the present invention;

Fig. 15 is a flow chart showing processing executed in a character recognition block of the sixth embodiment according to the present invention;

Fig. 16 is a flow chart showing processing executed in a character recognition result post-processor of the sixth embodiment according to the present invention; and

Fig. 17 is a graph showing the relationship between the rejection ratio and accuracy of recognized character.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Preferred embodiments of the present invention will be described in detail with reference to drawings.

<Embodiment 1>

Fig. 1 is a block diagram showing the construction of a communication system of a first embodiment according to the present invention.

As shown in Fig. 1, the communication system is composed of a mobile terminal 100 and a central control unit 200. In addition, the mobile terminal 100 and central control unit 200 are connected via a wireless network 300. Furthermore, here, one mobile terminal 100 and one central control unit 200 constructs the

communication system, but the first embodiment can be also applied to a case of a communication system comprising a plurality of mobile terminals 100.

Moreover, in case each mobile terminal of the plurality
5 of mobile terminals 100 communicates with the central control unit 200, the central control unit 200 can identify each mobile terminal by starting communication, for example, after each mobile terminal issuing an identification signal different from others to the
10 central control unit 200.

In a mobile terminal 100, symbol 102 shows a read manuscript. Symbol 104 shows a scanner reading the read manuscript 102 and generating an image signal. Symbol 106 shows a character recognition block performing
15 character recognition of the image signal generated in the scanner 104 with using a recognition dictionary 106a. Symbol 106b shows an unrecognizableness judging block judging whether a character recognition candidate outputted by the character recognition block 106 is
20 unrecognizable, on the basis of a threshold for judgement of unrecognizableness. Symbol 108 shows a character recognition result transmitter transmitting the result of character recognition by the character recognition block 106 to the central control unit 200.
25 Symbol 110 shows a threshold receiver receiving the threshold for judgement of unrecognizableness from the

central control unit 200.

In the central control unit 200, symbol 202 shows a character recognition result receiver receiving the result of character recognition from the mobile terminal 100. Symbol 208 is a character recognition result post-processor performing post-processing of the result of character recognition received by the character recognition result receiver 202. Symbol 208a shows a storage block storing data such as processing-result by the character recognition result post-processor 208. Symbol 210 shows a display unit displaying the processing-result by the character recognition result post-processor 208. Symbol 204 shows a threshold controller setting a threshold for judgement of unrecognizableness from the result of character recognition received by the character recognition result receiver 202. Symbol 206 shows a threshold transmitter transmitting the threshold for judgement of unrecognizableness set by the threshold controller 204 to the mobile terminal 100.

In addition, in each of the mobile terminal 100 and central control unit 200, a CPU, RAM, and ROM, which are not shown, are mounted. A CPU mounted in each terminal executes various programs after developing the various programs that are stored in the ROM and are used for controlling equipment. In addition, the RAM also

functions as a working area and a temporary save area.

Next, the operation of the communication system of the first embodiment will be described with reference to Fig. 1.

5 From the read manuscript 102 prepared in the mobile terminal 100, an image signal is generated by the scanner 104. The image signal is sent to the character recognition block 106, where character recognition is performed. The threshold receiver 110 receives the
10 threshold for judgement of unrecognizableness, set in the threshold controller 204 of the central control unit 200, via the wireless network 300. Here, the character recognition block 106 compares the threshold for judgement of unrecognizableness, received by the
15 threshold receiver 110, with similarity of each recognition candidate character. If the similarity of the recognition candidate character is larger than the threshold for judgement of unrecognizableness as a result of the comparison, the character recognition
20 block 106 outputs a character code, corresponding to the recognition candidate character, as a recognition result. On the other hand, if the similarity of the recognition candidate character is less than the threshold for judgement of unrecognizableness, the block
25 106 outputs a predetermined rejection code as an unrecognizable character. In addition, the detail of the

processing executed in the character recognition block 106 will be described later. The character recognition result transmitter 108 transmits a character code, which is the result of character recognition, and a rejection
5 code, which shows unrecognizableness, to the central control unit 200 via the wireless network 300.

On the other hand, in the central control unit 200, first, the character recognition result receiver 202 receives the result of character recognition that is
10 transmitted from the mobile terminal 100. The result of character recognition that is received is corrected by the character recognition result post-processor 208, is stored by the storage block 208a, and is processed like searching data, stored in the storage block 208a, with
15 using the result of character recognition as a key. The processing-result is displayed on the display unit 210. The threshold controller 204 judges a number of results of character recognition that are received by the character recognition result receiver 202, and sets the
20 optimum threshold for judgement of unrecognizableness in the unrecognizable judging block 106 of the mobile terminal 100. In addition, detail of the processing executed in the threshold controller 204 will be described later. The threshold for judgement of
25 unrecognizableness set in the threshold controller 204 is transmitted to the mobile terminal 100 by the

threshold transmitter 206 via the wireless network 300.

Next, the processing executed in the first embodiment will be described with reference to Figs. 2 and 3. In addition, in particular, the processing
5 executed in the character recognition block 106 and threshold controller 204 that are important parts of the first embodiment will be described in detail.

Fig. 2 is a flow chart showing the processing executed in the character recognition block of a first
10 embodiment according to the present invention.

First, at step S300, the character recognition block 106 in the mobile terminal 100 performs character extraction that characters are separated from the image signal inputted from the scanner 104. At step S302, the
15 character recognition block 106 performs predetermined feature extraction from the character image signal separated at the step S300. At step S304, the block 106 calculates the similarity of the image signal of the recognition object character to learned characters in
20 the recognition dictionary 106a on the basis of the feature extracted at the step S302. At step S306, the block 106 selects the predetermined number of recognition candidate characters in the order of their amount, and sorts the recognition candidate characters.
25 Furthermore, this number of recognition candidate characters is set in a number-of-recognition-candidate-

characters register (not shown).

At step S308, the block 106 compares the similarity of the first candidate of the recognition candidate characters, that is, the recognition candidate character having the largest similarity, with the threshold for judgement of unrecognizableness with using the unrecognizableness judging block 106b. If the similarity of the first candidate is less than the threshold for judgement of unrecognizableness (NO at the step S308), the process goes to step S310, where a predetermined identifier, that is, a rejection code is outputted with judging the recognition object character as an unrecognizable character. On the other hand, if the similarity of the first candidate is larger than the threshold for judgement of unrecognizableness (YES at the step S308), the process goes to step S312 as successful recognition since it is possible to output at least one result of character recognition.

At the step S312, two is substituted to a number-of-recognition-candidate-characters counter i (not shown) counting the number of the recognition candidate characters processed. At step S314, it is judged whether the content of the number-of-recognition-candidate-characters counter i exceeds the number of recognition candidate characters set in the number-of-recognition-candidate-characters register. If the content of the

number-of-recognition-candidate-characters counter i
exceeds the number of recognition candidate characters
(YES at step S314), the subsequent processing is stopped
since there is no recognition candidate character over
5 the number. Then, the process goes to step S316. In
addition, at the step S316, all the character codes
corresponding to the recognition candidate characters
having similarity exceeding the threshold for judgement
of unrecognizableness are outputted. On the other hand,
10 if the content of the number-of-recognition-candidate-
characters counter i does not exceed the number of
recognition candidate characters (NO at the step S314),
the process goes to step S318.

At the step S318, the similarity of the ith
15 candidate is compared with the threshold for judgement
of unrecognizableness. If the similarity of the ith
candidate is less than the threshold for judgement of
unrecognizableness (NO at the step S318), the ith
candidate and subsequent candidates are judged as
20 unrecognizable characters. Then, the process goes to the
step S316. On the other hand, if the similarity of the
ith candidate is larger than the threshold for judgement
of unrecognizableness (YES at the step S318), the
process goes to step S320, where the number-of-
25 recognition-candidate-characters counter i is
incremented and the process returns to the step S314.

In addition, the number-of-recognition-candidate-
characters register and number-of-recognition-candidate-
characters counter are implemented, for example, in the
RAM mounted in the central control unit 200, or are
5 constructed with dedicated hardware.

Owing to above processing, the rejection ratio
judged has the tendency shown in Fig. 17. Thus, if the
rejection ratio is high, the correct solution ratio of
characters judged as recognizable characters increase,
10 but their number is few. On the contrary, if the
rejection ratio is low, the number of characters judged
as recognizable characters is large, but the correct
solution ratio of the characters also decreases. Then,
in the first embodiment, in order that character
15 recognition in the mobile terminal 100 may be executed
at an optimum rejection ratio, the threshold controller
104 of the central control unit 200 resets the threshold
for judgement of unrecognizableness according to a
judgement state of the unrecognizableness judging block
20 106b of the mobile terminal 100.

Fig. 3 is a flow chart showing the processing
executed in the threshold controller of the first
embodiment of the present invention.

At step S402, on the basis of the result of
25 character recognition received by the character
recognition result receiver 202, it is judged whether

the number of unrecognizable characters (rejection codes) per read manuscript is not less than the first threshold TH1. If the number of unrecognizable characters is not less than the first threshold TH1 (YES at the step S402), the controller 104 judges that the read condition of the read manuscript on the scanner 104 of the mobile terminal 100 becomes worse due to some reason. Then, the process goes to step S406. In addition, at the step S406, so as to increase the number of recognizable characters, the controller 104 resets the threshold for judgement of unrecognizableness to a value less than the current threshold for judgement of unrecognizableness that is set in the unrecognizableness judging block 106b of the mobile terminal 100. After that, the process is ended.

On the other hand, if the number of unrecognizable characters is less than the first threshold TH1 (NO at the step S402), the process goes to step S404. At the step S404, it is judged whether the number of unrecognizable characters is less than the second threshold TH2 ($< TH1$). If the number of unrecognizable characters is less than the second threshold TH2 (YES at the step S404), the controller 104 judges that the correct solution ratio of the result of character recognition becomes worse, and the process goes to step S408. Then, at the step S408, so as to increase the

correct solution ratio of recognition results, the controller 104 resets the threshold for judgement of unrecognizableness to a value that is larger than the current threshold for judgement of unrecognizableness
5 that is set in the unrecognizableness judging block 106b of the mobile terminal 100. After that, the process is ended.

On the other hand, if the number of unrecognizable characters is not less than the second threshold TH2 (NO
10 at the step S404), the controller 104 judges that the current threshold for judgement of unrecognizableness is adequate, and ends the processing.

As described above, according to the first embodiment, it is possible to always obtain the result
15 of character recognition having the optimum accuracy by an operator judging the character recognition state of each mobile terminal 100 in the central control unit 200 and adaptively controlling the threshold for judgement of unrecognizableness used for judgement in the
20 unrecognizableness judging block 106b of the mobile terminal 100. In particular, in case that the recognition state in the mobile terminal 100 side changes every moment, the present invention can largely contribute to making the character recognition
25 processing of the mobile terminal 100 efficient.

Although, in the first embodiment, the number of

recognition candidate characters that the character
recognition block 106 of the mobile terminal 100 outputs
is plural, the present invention is not limited to this.
For example, with selecting a recognition candidate
5 character having the largest similarity as only one
recognition candidate character, the unrecognizableness
judging block 106b can perform judgement. In this case,
it becomes possible to accelerate the processing.

Although, in the first embodiment, the
10 communication system composed of the mobile terminal 100
and central control unit 200 that are connected via the
wireless network 300 is described, the present invention
is not limited to this. For example, there is no problem
even if a communication system is composed of terminals
15 and a central control unit 200 that are connected via a
wired network, internet, intranet, and etc..

<Embodiment 2>

Fig. 4 is a block diagram showing the construction
of a communication system of a second embodiment
20 according to the present invention.

As shown in Fig. 4, the communication system is
composed of a mobile terminal 120 and a central control
unit 220. In addition, the mobile terminal 120 and
central control unit 220 are connected via a wireless
25 network 320. Furthermore, here, one mobile terminal 120
and one central control unit 220 constructs the

communication system, but the second embodiment can be also applied to a case of a communication system comprising a plurality of mobile terminals 120.

Moreover, in case each mobile terminal of the plurality
5 of mobile terminals 120 communicates with the central control unit 220, the central control unit 220 can identify each mobile terminal by starting communication, for example, after each mobile terminal issuing an identification signal different from others to the
10 central control unit 220.

In a mobile terminal 120, symbol 122 shows a read manuscript. In addition, for example, a manuscript ID showing recognition position information of recognition areas that are classified every character font
15 constructed in the read manuscript is added to the read manuscript 122. Symbol 124 shows a scanner reading the read manuscript 122 and generating an image signal including the manuscript ID. Symbol 126 shows a character recognition block performing character
20 recognition every recognition area of the image signal generated in the scanner 124 with selecting a recognition dictionary, which is shown by recognition dictionary information, from a recognition dictionary group 126a on the basis of the recognition dictionary
25 information and positional information that is received by a recognition dictionary information & positional

information receiver 121. Symbol 127 shows a manuscript
ID recognition block recognizing a manuscript ID in the
image signal generated. Symbol 128 shows a character
recognition result & manuscript ID transmitter
5 transmitting the result of character recognition by the
character recognition block 126 and the result of
manuscript ID recognition by the manuscript ID
recognition block 127 to the central control unit 220.
Symbol 121 shows the recognition dictionary information
10 & positional information receiver receiving the
positional information showing a recognition area of the
image signal and the recognition dictionary information
showing a recognition dictionary used for recognition of
the recognition area from the central control unit 220.
15 In the central control unit 220, symbol 222 shows a
character recognition result & manuscript ID receiver
receiving the result of character recognition and the
result of manuscript ID recognition from the mobile
terminal 120. Symbol 228 is a character recognition
20 result post-processor performing post-processing of the
result of character recognition received by the
character recognition result & manuscript ID receiver
222. Symbol 228a shows a storage block storing data such
as processing-result by the character recognition result
25 post-processor 228. Symbol 223 shows a display unit
displaying processing-result by the character

recognition result post-processor 228. Symbol 224 shows
a recognition dictionary setting block setting the
recognition dictionary information, showing a
recognition dictionary for each recognition area in the
5 image signal of a recognition object, from the result of
manuscript ID recognition received by the character
recognition result & manuscript ID receiver 222 with
referring to a recognition dictionary information
database 224a. The symbol 224a shows the recognition
10 dictionary information database managing recognition
dictionary information, showing a recognition dictionary
optimum for recognition of the recognition area, every
image signal shown by the manuscript ID. Symbol 226
shows a recognition dictionary information & positional
15 information transmitter transmitting positional
information and recognition dictionary information of
each recognition area in the image signal, which is set
in the recognition dictionary setting block 224, to the
mobile terminal 120.

20 In addition, in each of the mobile terminal 120 and
central control unit 220, a CPU, RAM, and ROM, which are
not shown, are mounted. A CPU mounted in each terminal
executes various programs after developing the various
programs that are stored in the ROM and is used for
25 controlling equipment. In addition, the RAM also
functions as a working area and a temporary save area.

Next, the operation of the communication system of the second embodiment will be described with reference to Fig. 4.

From the read manuscript 122 prepared in the mobile
5 terminal 120, an image signal including a manuscript ID
corresponding to the read manuscript 122 is generated by
the scanner 124. The image signal is sent to the
character recognition block 126, where character
recognition is performed. The recognition dictionary
10 information & positional information receiver 121
receives positional information and recognition
dictionary information of each recognition area in the
image signal of a recognition object, which is set in
the recognition dictionary information setting block 224
15 of the central control unit 220, via the wireless
network 320. Here, the character recognition block 126
compares similarity of recognition candidate characters
in each recognition area with using a recognition
dictionary shown by the recognition dictionary
20 information for each recognition area in the image
signal received by the recognition dictionary
information & positional information receiver 121. Then,
on the basis of the comparison result, the character
recognition block 126 outputs a recognition result. In
25 addition, detailed processing executed in the character
recognition block 126 will be described later. The

character recognition result & manuscript ID transmitter
128 transmits a character code, which is the result of
character recognition by the character recognition block
126, and the result of manuscript ID recognition by the
5 manuscript ID recognition block 127, to the central
control unit 220 via the wireless network 320.

On the other hand, in the central control unit 220,
first, the character recognition result & manuscript ID
receiver 222 receives the result of character
10 recognition and the result of manuscript ID recognition
that are transmitted from the mobile terminal 120. The
result of character recognition received is corrected by
the character recognition result post-processor 228, is
stored by the storage block 228a, and is processed like
15 searching data, stored in the storage block 228a, with
using the result of character recognition as a key. The
processing-result is displayed on the display unit 223.
The recognition dictionary information setting block 224
sets recognition dictionary information, showing a
20 recognition dictionary optimum for each recognition area
in the image signal of the recognition object, on the
basis of the result of manuscript ID recognition which
is received, with referring to the recognition
dictionary information database 224a. Furthermore, the
25 positional information every recognition area is also
obtained. In addition, the processing executed in the

recognition dictionary information setting block 224 will be described later in detail. The recognition dictionary information and positional information of each recognition area in the image signal of the

5 recognition object, which is set in the recognition dictionary information setting block 224 is transmitted to the mobile terminal 120 by the recognition dictionary information & positional information transmitter 226 via the wireless network 320.

10 Next, the processing executed in the second embodiment will be described with reference to Figs. 5 and 6. In addition, here, in particular, the processing executed in the character recognition block 126 and recognition dictionary information setting block 224

15 that are important parts of the present invention will be described in detail.

Fig. 5 is a flow chart showing the processing executed in the character recognition block of a second embodiment according to the present invention.

20 First, at step S320, the character recognition block 126 performs character extraction that characters are separated from the image signal inputted from the scanner 124. At step S321, the manuscript ID recognition block 127 recognizes a manuscript ID included in the

25 image signal inputted. Then, the manuscript ID recognition block 127 judges on the basis of the

manuscript ID, which is recognized, a recognition area
where the character that is extracted at the step S320
belongs among the recognition areas of the image signal.
At step S322, the character recognition block 126
5 performs predetermined feature extraction from the
character extracted at the step S320. At step S324, the
block 126 calculates the similarity of the recognition
object character to learned characters in the
recognition dictionary 126a every recognition area on
10 the basis of the feature extracted at the step S322. At
step S326, the block 126 selects the predetermined
number of recognition candidate characters in the order
of their amount, and sorts the recognition candidate
characters. At step S328, all the character codes
15 corresponding to recognition candidate characters are
outputted.

Fig. 6 is a flow chart showing the processing
executed in the recognition dictionary information
setting block of the second embodiment of the present
20 invention.

At step 420, the manuscript ID of the image signal
of the recognition object is judged according to the
result of manuscript ID recognition received in the
character recognition result & manuscript ID receiver
25 222. At step S422, data (recognition dictionary
information and positional information of each

recognition area of the image signal of the recognition object) corresponding to the manuscript ID judged at the step S420 is obtained from the recognition dictionary information database 224a.

5 As described above, according to the second embodiment, it is possible to increase recognition accuracy in each recognition area. This is because the central control unit 220 can set a recognition dictionary optimum for each recognition area of the
10 image signal inputted in the mobile terminal 120, on the basis of the result of manuscript ID recognition inputted from the mobile terminal 120. In particular, in case that characters whose writers are different or different fonts are mixed, or a format of a read
15 manuscript changes in the same read manuscript, the present invention can perform excellently accurate character recognition of the read manuscript, and can largely increase the efficiency of processing.

 Although, in the second embodiment, the
20 communication system composed of the mobile terminal 120 and central control unit 220 that are connected via the wireless network 320 is described, the second embodiment is not limited to this. For example, there is no problem even if a communication system is composed of terminals
25 and a central control unit 220 that are connected via a wired network, internet, intranet and etc..

<Embodiment 3>

A third embodiment is a modified example of the first embodiment. The construction different from that of the first embodiment is new provision of a threshold
5 input block 234, which enables a user to input an optional threshold, instead of the threshold controller 204.

Fig. 7 is a block diagram showing the construction of a communication system of the third embodiment
10 according to the present invention.

Symbol 234 shows the threshold input block inputting a threshold for judgement of unrecognizableness. In the threshold input block 234, an operator determines an optimum threshold for judgement
15 of unrecognizableness on the basis of the processing result obtained by the character recognition result post-processor 208, and inputs the optimum threshold. In addition, the processing executed in the threshold input block 234 will be described later in detail. The
20 threshold for judgement of unrecognizableness that is inputted from the threshold input block 234 is transmitted to the mobile terminal 100 by the threshold transmitter 210 via the wireless network 300.

Next, as the processing executed in the third
25 embodiment, the processing similar to that of the first embodiment in Fig. 2 is executed. Then, owing to the

processing described in Fig. 2, the rejection ratio
judged has the tendency shown in Fig. 17. Thus, if the
rejection ratio is high, the correct solution ratio of
characters judged as recognizable characters increase,
5 but their number is few. On the contrary, if the
rejection ratio is low, the number of characters judged
as recognizable characters is many, but the correct
solution ratio of the characters also decreases. Then,
in the third embodiment, in order that character
10 recognition in the mobile terminal 100 may be executed
at an optimum rejection ratio, the threshold input block
234 of the central control unit 200 resets the threshold
for judgement of unrecognizableness according to a
judgement state of the unrecognizableness judging block
15 106b of the mobile terminal 100.

Concretely, the threshold for judgement of
unrecognizableness in the unrecognizableness judging
block 106b of the mobile terminal 100 is changed from
the threshold input block 234 of the central control
20 unit 200.

Thus, an operator in the central control unit 200
judges that the accuracy of the result of character
recognition transmitted from the mobile terminal 100 is
hard or it is necessary to reduce the character
25 recognition accuracy a little bit if, for example, the
operator judges that the number of unrecognizable

characters per read manuscript in a mobile terminal 100 is extremely many. Then, the operator inputs a threshold for judgement of unrecognizableness, which is lower than the current threshold for judgement of

5 unrecognizableness, from the threshold input block 234. Furthermore, the threshold transmitter 210 transmits the threshold for judgement of unrecognizableness to the corresponding mobile terminal 100, and the operator controls this system so as to be able to receive further
10 plenty of normal recognition results. On the other hand, if the operator judges that the number of unrecognizable characters per read manuscript is few, the operator judges that the accuracy of the result of character recognition transmitted from the mobile terminal 100

15 becomes worse or there is a space for further increasing the character recognition accuracy. Then, the operator inputs a threshold for judgement of unrecognizableness, which is higher than the current threshold for judgement of unrecognizableness, from the threshold input block
20 234. Furthermore, the threshold transmitter 210 transmits the threshold for judgement of unrecognizableness to the corresponding mobile terminal 100.

As described above, according to the third
25 embodiment, it becomes possible to always obtain the result of character recognition having desired accuracy.

This is because, in the central control unit 200, an operator judges the result of character recognition in each mobile terminal 100 and inputs a threshold for judgement of unrecognizableness that is used for
5 judgement in the unrecognizableness judging block 106b of the mobile terminal 100. In particular, in case that the recognition state in the mobile terminal 100 changes every moment, the present invention can largely contribute to making the character recognition
10 processing of the mobile terminal 100 efficient.

Although, in the third embodiment, the number of recognition candidate characters that the character recognition block 106 of the mobile terminal 100 outputs is plural, the present invention is not limited to this.
15 For example, with selecting a recognition candidate character having the largest similarity as only one recognition candidate character, the unrecognizableness judging block 106b can perform judgement. In this case, it becomes possible to accelerate the processing.

20 Although, in the third embodiment, the communication system composed of the mobile terminal 100 and central control unit 200 that are connected via the wireless network 300 is described, the third embodiment is not limited to this. For example, there is no problem
25 even if a communication system is composed of terminals and a central control unit 200 that are connected via a

wired network, internet, intranet and etc..

<Embodiment 4>

Fig. 8 is a block diagram showing the construction of a communication system of a fourth embodiment according to the present invention.

As shown in Fig. 8, the communication system is composed of a mobile terminal 140 and a central control unit 240. In addition, the mobile terminal 140 and central control unit 240 are connected via a wireless network 340. Furthermore, here, one mobile terminal 140 and one central control unit 240 constructs the communication system, but the fourth embodiment can be also applied to a case of a communication system comprising a plurality of mobile terminals 140. Moreover, in case each mobile terminal among the plurality of mobile terminals 140 communicates with the central control unit 240, the central control unit 240 can identify each mobile terminal by starting communication, for example, after each mobile terminal issuing an identification signal different from others to the central control unit 240.

In a mobile terminal 140, symbol 142 shows a read manuscript. In addition, for example, a manuscript ID showing recognition position information of recognition areas that are classified every character font constructed in the read manuscript is added to the read

manuscript 142. Symbol 144 shows a scanner reading the
read manuscript 142 and generating an image signal
including the manuscript ID. Symbol 146 shows a
character recognition block performing character
5 recognition of the image signal generated in the scanner
144 with using a recognition dictionary 146a. Symbol
146b shows a unrecognizableness judging block judging
whether a recognition candidate character outputted by
the character recognition block 146 is unrecognizable,
10 on the basis of a threshold for judgement of
unrecognizableness. Symbol 147 shows a manuscript ID
recognition block recognizing a manuscript ID in the
image signal generated. Symbol 148 shows a character
recognition result & manuscript ID transmitter
15 transmitting the result of character recognition by the
character recognition block 146 and the result of
manuscript ID recognition by the manuscript ID
recognition block 147 to the central control unit 240.
Symbol 141 shows the threshold & positional information
20 receiver receiving the positional information showing a
recognition area of the image signal and a threshold for
judgement of unrecognizableness in the recognition area
from the central control unit 240.

In the central control unit 240, symbol 242 shows a
25 character recognition result & manuscript ID receiver
receiving the result of character recognition and the

result of manuscript ID recognition from the mobile
terminal 140. Symbol 248 is a character recognition
result post-processor performing post-processing of the
result of character recognition received by the
5 character recognition result & manuscript ID receiver
242. Symbol 248a shows a storage block storing data such
as processing-result by the character recognition result
post-processor 248. Symbol 241 shows a display unit
displaying processing-result by the character
10 recognition result post-processor 248. Symbol 244 shows
a threshold controller setting a threshold for judgement
of unrecognizableness in each recognition area in the
image signal of the recognition object from the result
of manuscript ID recognition received by the character
15 recognition result receiver 242 with referring to a
threshold database 244a. The symbol 244a shows the
threshold database managing an optimum threshold for
judgement of unrecognizableness in a recognition area of
each image signal every image signal shown by the
20 manuscript ID every read manuscript. Symbol 246 shows a
threshold & positional information transmitter
transmitting positional information of each recognition
area in the image signal, which is set in the threshold
controller 244, and a threshold for judgement of
25 unrecognizableness of each recognition area to the
mobile terminal 140.

In addition, in each of the mobile terminal 140 and central control unit 240, a CPU, RAM, and ROM, which are not shown, are mounted. A CPU mounted in each terminal executes various programs after developing the various programs which are stored in the ROM and is used for controlling equipment. In addition, the RAM also functions as a working area and a temporary save area.

Next, the operation of the communication system of the fourth embodiment will be described with reference to Fig. 8.

From the read manuscript 142 prepared in the mobile terminal 140, an image signal including a manuscript ID corresponding to the read manuscript 142 is generated by the scanner 144. The image signal is sent to the character recognition block 146, where character recognition is performed. The threshold & positional information receiver 141 receives positional information of each recognition area in the image signal of a recognition object and the threshold for judgement of unrecognizableness, which are set in the threshold controller 244 of the central control unit 240, via the wireless network 340. Here, character recognition block 146 compares a threshold for judgement of unrecognizableness in each recognition area of the image signal received by the threshold & positional information receiver 141 and the similarity of the

recognition candidate character in each recognition area. As a result of comparison, if the similarity of the recognition candidate character is larger than the threshold for judgement of unrecognizableness, the block 5 146 outputs a character code corresponding to the recognition candidate character as the recognition result. On the other hand, if the similarity of the recognition candidate character is less than the threshold for judgement of unrecognizableness, the block 10 146 outputs a predetermined rejection code as an unrecognizable character. In addition, processing executed in the character recognition block 146 will be described later in detail. The character recognition result & manuscript ID transmitter 148 transmits a 15 character code, which is the result of character recognition by the character recognition block 146, and a rejection code, which shows unrecognizableness, and the result of manuscript ID recognition by the manuscript ID recognition block 147, to the central 20 control unit 240 via the wireless network 340.

On the other hand, in the central control unit 240, first, the character recognition result & manuscript ID receiver 242 receives the result of character recognition and the result of manuscript ID recognition 25 that are transmitted from the mobile terminal 140. The result of character recognition received is corrected by

the character recognition result post-processor 248, is stored by the storage block 248a, and is processed like searching data, stored in the storage block 248a, with using the result of character recognition as a key. The processing-result is displayed on the display unit 241. The threshold controller 244 sets a threshold for judgement of unrecognizableness that is optimum for each recognition area in the image signal of the recognition object, on the basis of the result of manuscript ID recognition which is received, with referring to the threshold database 244a. Furthermore, the positional information every recognition area is also obtained. In addition, detail of the processing executed in the threshold controller 244 will be described later. The threshold for judgement of unrecognizableness and positional information of each recognition area in the image signal of the recognition object, which is set in the threshold controller 244, is transmitted to the mobile terminal 140 by the threshold & positional information transmitter 246 via the wireless network 340.

Next, the processing executed in the fourth embodiment will be described with reference to Figs. 9 and 10. In addition, here, in particular, the processing executed in the character recognition block 146 and threshold controller 244 that are important parts of the

fourth embodiment will be described in detail.

Fig. 9 is a flow chart showing the processing executed in the character recognition block of a fourth embodiment according to the present invention.

5 First, at step S340, the character recognition block 146 performs character extraction in which characters are separated from the image signal inputted from the scanner 144. At step S341, the manuscript ID recognition block 147 recognizes a manuscript ID
10 included in the image signal inputted. Then, the manuscript ID recognition block 147 judges on the basis of the manuscript ID, which is recognized, a recognition area where the character that is extracted at the step S340 belongs among the recognition areas of the image
15 signal. At step S342, the character recognition block 146 performs predetermined feature extraction from the character extracted at the step S340. At step S344, the block 146 calculates the similarity of the recognition object character to learned characters in the
20 recognition dictionary 146a on the basis of the feature extracted at the step S342. At step S346, the block 146 selects the predetermined number of recognition candidate characters in the order of their amount, and sorts the recognition candidate characters. In addition,
25 this number of recognition candidate characters is set in a number-of-recognition-candidate-characters register

(not shown).

At step S348, the block 146 compares the similarity of the first candidate of the recognition candidate characters, that is, the recognition candidate character having the largest similarity, with the threshold for judgement of unrecognizableness in the recognition area, where the recognition candidate character is included, with using the unrecognizableness judging block 146b. If the similarity of the first candidate is less than the threshold for judgement of unrecognizableness in the recognition area where the recognition candidate character is included (NO at the step S348), the process goes to step S340a, where a predetermined identifier, that is, a rejection code is outputted with judging the recognition object character as an unrecognizable character. On the other hand, if the similarity of the first candidate is larger than the threshold for judgement of unrecognizableness in the recognition area where the recognition candidate character is included (YES at the step S348), the process goes to step S342a as successful recognition since it is possible to output at least one result of character recognition.

At the step S342a, two is substituted to a number-of-recognition-candidate-characters counter i (not shown) counting the number of the recognition candidate characters processed. At step S344a, it is judged

whether the content of the number-of-recognition-
candidate-characters counter i exceeds the number of
recognition candidate characters set in the number-of-
recognition-candidate-characters register. If the
5 content of the number-of-recognition-candidate-
characters counter i exceeds the number of recognition
candidate characters (YES at step S344a), the subsequent
processing is stopped since there is no recognition
candidate character over the number. Then, the process
10 goes to step S346a. In addition, at the step S346a, all
the character codes corresponding to the recognition
candidate characters having similarity exceeding the
threshold for judgement of unrecognizableness are
outputted. On the other hand, if the content of the
15 number-of-recognition-candidate-characters counter i
does not exceed the number of recognition candidate
characters (NO at the step S344a), the process goes to
step S348a.

At the step S348a, similarity of the ith candidate
20 is compared with the threshold for judgement of
unrecognizableness in the recognition area where the
recognition candidate character is included. If the
similarity of the ith candidate is less than the
threshold for judgement of unrecognizableness in the
25 recognition area where the recognition candidate
character is included (NO at the step S348a), the ith

candidate and subsequent candidates are judged as
unrecognizable characters. Then, the process goes to the
step S346a. On the other hand, if the similarity of the
ith candidate is larger than the threshold for judgement
5 of unrecognizableness in the recognition area where the
recognition candidate character is included (YES at the
step S348a), the process goes to step S349a, where the
number-of-recognition-candidate-characters counter_i is
incremented and the process returns to the step S344a.

10 In addition, the number-of-recognition-candidate-
characters register and number-of-recognition-candidate-
characters counter are implemented, for example, in the
RAM mounted in the central control unit 200, or are
constructed with dedicated hardware.

15 Owing to above processing, the rejection ratio
judged in each recognition area of the image signal that
is shown by the manuscript ID has the tendency shown in
Fig. 17. Thus, if the rejection ratio is high, the
correct solution ratio of characters judged as
20 recognizable characters increase, but their number is
few. On the contrary, if the rejection ratio is low, the
number of characters judged as recognizable characters
is large, but the correct solution ratio of the
characters also decreases. Then, in the fourth
25 embodiment, in order that character recognition in the
mobile terminal 140 may be executed at an optimum

rejection ratio, the threshold controller 144 of the central control unit 240 sets the threshold for judgement of unrecognizableness optimum for each recognition area of the image signal, which is shown by
5 the manuscript ID, on the basis of the result of manuscript ID recognition in the manuscript ID recognition block 147 of the mobile terminal 140.

Fig. 10 is a flow chart showing the processing executed in the threshold controller of the fourth
10 embodiment of the present invention.

At step 440, the manuscript ID of the image signal of the recognition object is judged according to the result of manuscript ID recognition received in the character recognition result & manuscript ID receiver
15 242. At step S442, data (a threshold for judgement of unrecognizableness and positional information of each recognition area included in the image signal of the recognition object) corresponding to the manuscript ID judged at the step S440 is obtained from the threshold
20 database 244a.

As described above, according to the fourth embodiment, it is possible to increase recognition accuracy in each recognition area. This is because the central control unit 240 can set a threshold for
25 judgement of unrecognizableness that is optimum for each recognition area of the image signal inputted in the

mobile terminal 140, on the basis of the result of manuscript ID recognition inputted from the mobile terminal 140. In particular, in case that characters, whose writers are different, or different fonts are mixed in the same read manuscript, or a format of a read manuscript changes, the present invention can perform excellently accurate character recognition of the read manuscript, and can largely increase the efficiency of processing.

Although, in the fourth embodiment, the number of recognition candidate characters that the character recognition block 146 of the mobile terminal 140 outputs is plural, the present invention is not limited to this. For example, with selecting a recognition candidate character having the largest similarity as only one recognition candidate character, the unrecognizableness judging block 146b can perform judgement. In this case, it becomes possible to accelerate the processing.

Although, in the fourth embodiment, the communication system composed of the mobile terminal 140 and central control unit 240 that are connected via the wireless network 340 is described, the present invention is not limited to this. For example, there is no problem even if a communication system is composed of terminals and a central control unit 240 that are connected via a wired network, internet, intranet and etc..

<Embodiment 5>

Fig. 11 is a block diagram showing the construction of a communication system of a fifth embodiment according to the present invention.

As shown in Fig. 11, the communication system is composed of a mobile terminal 150 and a central control unit 250. In addition, the mobile terminal 150 and central control unit 250 are connected via a wireless network 350. Furthermore, here, one mobile terminal 150 and one central control unit 250 constructs the communication system, but the present invention can be also applied to a case of a communication system comprising a plurality of mobile terminals 150. Moreover, in case each mobile terminal among the plurality of mobile terminals 150 communicates with the central control unit 250, the central control unit 250 can identify each mobile terminal by starting communication, for example, after each mobile terminal issuing an identification signal different from others to the central control unit 250.

In a mobile terminal 150, symbol 152 shows a read manuscript. Symbol 154 shows a scanner reading the read manuscript 152 and generating an image signal. Symbol 156 shows a character recognition block that recognizes a recognition area of the image signal generated by the scanner 154 and performing character recognition in the

recognition area, which is recognized, with using a
recognition dictionary 156a. Symbol 156b shows a
unrecognizableness judging block judging whether a
recognition candidate character outputted by the
5 character recognition block 156 is unrecognizable, on
the basis of a threshold for judgement of
unrecognizableness. Symbol 158 shows a character
recognition result transmitter transmitting the result
of character recognition by the character recognition
10 block 156 and positional information showing the
recognition area to the central control unit 250. Symbol
151 shows the threshold & positional information
receiver receiving the positional information showing
the recognition area of the image signal and a threshold
15 for judgement of unrecognizableness in the recognition
area from the central control unit 250.

In the central control unit 250, symbol 252 shows a
character recognition result receiver receiving the
result of character recognition and positional
20 information from the mobile terminal 150. Symbol 258 is
a character recognition result post-processor performing
post-processing of the result of character recognition
received by the character recognition result receiver
252. Symbol 258a shows a storage block storing data such
25 as processing-result by the character recognition result
post-processor 258. Symbol 251 shows a display unit

displaying the processing-result by the character
recognition result post-processor 258. Symbol 254 shows
a threshold controller that judges the number of results
of character recognition in each recognition area in the
5 image signal of the recognition object, which is shown
by the positional information received by the character
recognition result receiver 252, and sets a threshold
for judgement of unrecognizableness optimum for each
recognition area in the unrecognizableness judging block
10 156b of the mobile terminal 150. Symbol 256 shows a
threshold & positional information transmitter
transmitting positional information and a threshold for
judgement of unrecognizableness of each recognition area
in the image signal, which is set in the threshold
15 controller 254, to the mobile terminal 150.

In addition, in each of the mobile terminal 150 and
central control unit 250, a CPU, RAM, and ROM, which are
not shown, are mounted. A CPU mounted in each terminal
executes various programs after developing the various
20 programs that are stored in the ROM and is used for
controlling equipment. In addition, the RAM also
functions as a working area and a temporary save area.

Next, the operation of the communication system of
the fifth embodiment will be described with reference to
25 Fig. 11.

From the read manuscript 152 prepared in the mobile

terminal 150, an image signal corresponding to the read manuscript 152 is generated by the scanner 154. The image signal generated is sent to the character recognition block 156, where a recognition area is

5 recognized and character recognition in the recognition area recognized is performed. The threshold & positional information receiver 151 receives the positional information of and the threshold for judgement of .

10 unrecognizedness for each recognition area in the image signal of a recognition object, which is set in the threshold controller 254 of the central control unit 250, via the wireless network 350. Here, character recognition block 156 compares a threshold for judgement of unrecognizedness in each recognition area of the

15 image signal received by the threshold & positional information receiver 151 and the similarity of the recognition candidate character in each recognition area. As a result of comparison, if the similarity of the recognition candidate character is larger than the

20 threshold for judgement of unrecognizedness, the block 156 outputs a character code corresponding to the recognition candidate character as the recognition result. On the other hand, if the similarity of the recognition candidate character is less than the

25 threshold for judgement of unrecognizedness, the block 156 outputs a predetermined rejection code as an

unrecognizable character. In addition, the processing executed in the character recognition block 156 will be described in detail later. The character recognition result transmitter 158 transmits a character code, which
5 is the result of character recognition by the character recognition block 156, and the rejection code showing unrecognizableness, to the central control unit 250 via the wireless network 350.

On the other hand, in the central control unit 250,
10 first, the character recognition result receiver 252 receives the result of character recognition and positional information that are transmitted from the mobile terminal 150. The result of character recognition received is corrected by the character recognition
15 result post-processor 258, is stored by the storage block 258a, and is processed like searching data, stored in the storage block 258a, with using the result of character recognition as a key. The processing-result is displayed on the display unit 251. The threshold
20 controller 254 sets a threshold for judgement of unrecognizableness that is optimum for each recognition area in the image signal of the recognition object, on the basis of the result of character recognition in each recognition area, which is shown by the positional
25 information received. In addition, the processing executed in the threshold controller 254 will be

described later in detail. The threshold for judgement of unrecognizableness for and positional information of each recognition area in the image signal of the recognition object, which is set in the threshold

5 controller 254 is transmitted to the mobile terminal 150 by the threshold & positional information transmitter 256 via the wireless network 350.

Next, the processing executed in the fifth embodiment will be described with reference to Figs. 12 and 13. In addition, here, in particular, the processing executed in the character recognition block 156 and threshold controller 254 that are important parts of the fifth embodiment will be described in detail.

Fig. 12 is a flow chart showing the processing executed in the character recognition block of a fifth embodiment according to the present invention.

First, at step S350, the character recognition block 156 performs character extraction in which characters are separated from the image signal inputted from the scanner 154. At step S351, the block 156 recognizes the recognition area in the image signal. Then, the block 156 judges on the basis of the recognition area, which is recognized, a recognition area where the character that is extracted at the step S350 belongs. At step S352, the character recognition block 156 performs predetermined feature extraction from

the character extracted at the step S350. At step S354, the block 156 calculates similarity of the recognition object character to learned characters in the recognition dictionary 156a on the basis of the feature
 5 extracted at the step S352. At step S356, the block 156 selects the predetermined number of recognition candidate characters in the order of their amount, and sorts the recognition candidate characters. In addition, this number of recognition candidate characters is set
 10 in a number-of-recognition-candidate-characters register (not shown).

At step S358, the block 156 compares the similarity of the first candidate among the recognition candidate characters, that is, the recognition candidate character
 15 having the largest similarity with the threshold for judgement of unrecognizableness in the recognition area, where the recognition candidate character is included, with using the unrecognizableness judging block 156b. If the similarity of the first candidate is less than the
 20 threshold for judgement of unrecognizableness in the recognition area where the recognition candidate character is included (NO at the step S358), the process goes to step S350a, where a predetermined identifier, that is, a rejection code is outputted with judging the
 25 recognition object character as an unrecognizable character. On the other hand, if the similarity of the

first candidate is larger than the threshold for judgement of unrecognizableness in the recognition area where the recognition candidate character is included (YES at the step S358), the process goes to step S352a as successful recognition since it is possible to output at least one result of character recognition.

At the step S352a, two is substituted to a number-of-recognition-candidate-characters counter i (not shown) counting the number of the recognition candidate characters processed. At step S354a, it is judged whether the content of the number-of-recognition-candidate-characters counter i exceeds the number of recognition candidate characters set in the number-of-recognition-candidate-characters register. If the content of the number-of-recognition-candidate-characters counter i exceeds the number of recognition candidate characters (YES at step S354a), the subsequent processing is stopped since there is no recognition candidate character over the number. Then, the process goes to step S356a. In addition, at the step S356a, all the character codes corresponding to the recognition candidate characters having similarity exceeding the threshold for judgement of unrecognizableness are outputted. On the other hand, if the content of the number-of-recognition-candidate-characters counter i does not exceed the number of recognition candidate

characters (NO at the step S354a), the process goes to step S358a.

At the step S358a, similarity of the ith candidate is compared with the threshold for judgement of

5 unrecognizedness in the recognition area where the recognition candidate character is included. If the similarity of the ith candidate is less than the threshold for judgement of unrecognizedness in the recognition area where the recognition candidate
10 character is included (NO at the step S358a), the ith candidate and subsequent candidates are judged as unrecognizable characters. Then, the process goes to the step S356a. On the other hand, if the similarity of the ith candidate is larger than the threshold for judgement
15 of unrecognizedness in the recognition area where the recognition candidate character is included (YES at the step S358a), the process goes to step S359a, where the number-of-recognition-candidate-characters counter i is incremented and the process returns to the step S354a.

20 In addition, the number-of-recognition-candidate-characters register and number-of-recognition-candidate-characters counter are implemented, for example, in the RAM mounted in the central control unit 250, or are constructed with dedicated hardware.

25 Owing to above processing, the rejection ratio judged in each recognition area of the image signal has

the tendency shown in Fig. 17. Thus, if the rejection ratio is high, the correct solution ratio of characters judged as recognizable characters increase, but their number is few. On the contrary, if the rejection ratio is low, the number of characters judged as recognizable characters is large, but the correct solution ratio of the characters also decreases. Then, in the fifth embodiment, in order that character recognition in the mobile terminal 150 may be executed at an optimum rejection ratio, the threshold controller 154 of the central control unit 250 sets the threshold for judgement of unrecognizableness optimum for each recognition area of the image signal, on the basis of the result of character recognition in each recognition area by the character recognition block 156 of the mobile terminal 150.

Fig. 13 is a flow chart showing the processing executed in the threshold controller of the fifth embodiment of the present invention.

At step 450, the threshold controller 254 initializes a recognition area pointer i showing a recognition area of a processing object in an image signal. In addition, a number is assigned to each recognition area in the image signal in order, and the threshold controller 254 processes each recognition area according to a value shown by the recognition area

pointer i. Furthermore, the number of the recognition areas in the image signal is stored in a number-of-recognition-areas register. At step S452, on the basis of the result of character recognition and positional
5 information that is received by the character recognition result receiver 252, it is judged whether the number of unrecognizable characters (rejection codes) in the recognition area corresponding to the ith area that is shown by the recognition area pointer i is
10 not less than the first threshold TH1. If the number of unrecognizable characters is not less than the first threshold TH1 (YES at the step S452), the controller 254 judges that the read condition of the scanner 154 in the mobile terminal 150 that reads the recognition area
15 corresponding to the ith area becomes worse due to some reason. Then, the process goes to step S456. In addition, at the step S456, so as to increase the number of recognizable characters, the controller 254 resets the threshold for judgement of unrecognizableness to a
20 value less than the current threshold for judgement of unrecognizableness in the recognition area corresponding to the ith area that is set in the unrecognizableness judging block 156b of the mobile terminal 150. After that, the process is ended.

25 On the other hand, if the number of unrecognizable characters is less than the first threshold TH1 (NO at

the step S452), the process goes to step S454. At the
step S454, it is judged whether the number of
unrecognizable characters is less than the second
threshold TH2 ($< TH1$). If the number of unrecognizable
5 characters is less than the second threshold TH2 (YES at
the step S454), the controller 254 judges that the
correct solution ratio of the result of character
recognition becomes worse, and the process goes to step
S458. Then, at the step S458, so as to increase the
10 correct solution ratio of recognition results, the
controller 254 resets the threshold for judgement of
unrecognizableness to a value that is larger than the
current threshold for judgement of unrecognizableness in
the recognition area corresponding to the i th area that
15 is set in the unrecognizableness judging block 156b of
the mobile terminal 150. After that, the process is
ended.

On the other hand, if the number of unrecognizable
characters in the recognition area corresponding to the
20 i th area is not less than the second threshold TH2 (NO
at the step S454), the controller 254 judges that the
current threshold for judgement of unrecognizableness in
the recognition area corresponding to the i th area,
which is set in the unrecognizableness judging block
25 156b of the mobile terminal 150, is adequate, and ends
the processing.

At step S457, the controller 254 judges whether setting of thresholds for judgement of unrecognizableness is completed in regard to all the recognition areas in the image signal. Thus, the
5 controller 254 judges whether the value shown by the recognition area pointer i is equal to the value stored in the number-of-recognition-areas register. If the setting of thresholds for judgement of unrecognizableness is completed (YES at the step S457),
10 the process is ended. On the other hand, if the setting of thresholds for judgement of unrecognizableness is not completed (NO at the step S457), the process goes to step S459. At the step S459, a value of the recognition area pointer i is incremented by one, and the process
15 returns to the step S452.

In addition, the number-of-recognition-area pointer and number-of-recognition-area register are implemented, for example, in the RAM mounted in the central control unit 250, or are constructed with dedicated hardware.

20 As described above, according to the fifth embodiment, it is possible to increase recognition accuracy in each recognition area. This is because the central control unit 250 can set a threshold for judgement of unrecognizableness that is optimum for each
25 recognition area of the image signal inputted in the mobile terminal 150, on the basis of the result of

character recognition and recognition area that is inputted in the mobile terminal 150. In particular, in case that characters, whose writers are different, or different fonts are mixed in the same read manuscript, or a format of a read manuscript changes, the present invention can perform excellently accurate character recognition of the read manuscript, and can largely increase the efficiency of processing.

Although, in the fifth embodiment, the number of recognition candidate characters that the character recognition block 156 of the mobile terminal 150 outputs is plural, the present invention is not limited to this. For example, with selecting a recognition candidate character having the largest similarity as only one recognition candidate character, the unrecognizableness judging block 156b can perform judgement. In this case, it becomes possible to accelerate the processing.

Although, in the fifth embodiment, the communication system composed of the mobile terminal 150 and central control unit 250 that are connected via the wireless network 350 is described, the present invention is not limited to this. For example, there is no problem even if a communication system is composed of terminals and a central control unit 250 that are connected via a wired network, internet, intranet, and etc..

<Embodiment 6>

Fig. 14 is a block diagram showing the construction of a communication system of a sixth embodiment according to the present invention.

As shown in Fig. 14, the communication system is composed of a mobile terminal 160 and a central control unit 120. In addition, the mobile terminal 160 and central control unit 120 are connected via a wireless network 163. Furthermore, here, one mobile terminal 160 and one central control unit 120 constructs the communication system, but the present invention can be also applied to a case of a communication system comprising a plurality of mobile terminals 160. Moreover, in case each mobile terminal of the plurality of mobile terminals 160 communicates with the central control unit 120, the central control unit 120 can identify each mobile terminal by starting communication, for example, after each mobile terminal issuing an identification signal different from others to the central control unit 120.

In a mobile terminal 160, symbol 162 shows a read manuscript. Symbol 164 shows a scanner reading the read manuscript 162 and generating an image signal. Symbol 166 shows a character recognition block performing character recognition of the image signal generated in the scanner 164 with using a recognition dictionary 166a. Symbol 166b shows an unrecognizableness judging

block judging whether a character recognition candidate
outputted by the character recognition block 166 is
unrecognizable, on the basis of a threshold for
judgement of unrecognizableness. Symbol 168 shows a
5 character recognition result transmitter transmitting
the result of character recognition by the character
recognition block 166 to the central control unit 120.

In the central control unit 120, symbol 122 shows a
character recognition result receiver receiving the
10 result of character recognition from the mobile terminal
160. Symbol 124 is a character recognition result post-
processor performing post-processing of the result of
character recognition received by the character
recognition result receiver 122. Symbol 124a shows a
15 storage block storing data such as a processing-result
by the character recognition result post-processor 124.
Symbol 126 shows a display unit displaying the
processing-result by the character recognition result
post-processor 124. Symbol 128 shows an input block for
20 performing edition of the processing result, which is
displayed on the display unit 126, such as correction.

In addition, in each of the mobile terminal 160 and
central control unit 120, a CPU, RAM, and ROM, which are
not shown, are mounted. A CPU mounted in each terminal
25 executes various programs after developing the various
programs which are stored in the ROM and is used for

controlling equipment. In addition, the RAM also functions as a working area and a temporary save area.

Next, the operation of the communication system of the sixth embodiment will be described with reference to
5 Fig. 14.

From the read manuscript 162 prepared in the side of the mobile terminal 160, an image signal corresponding to the read manuscript 162 is generated by the scanner 164. The image signal generated is sent to
10 the character recognition block 166, where character recognition is performed. Here, the character recognition block 166 compares a threshold for judgement of unrecognizableness with similarity of each recognition candidate character. If the similarity of
15 the recognition candidate character is larger than the threshold for judgement of unrecognizableness as a result of the comparison, the character recognition block 166 outputs a character code, corresponding to the recognition candidate character, as a recognition
20 result. On the other hand, if the similarity of the recognition candidate character is less than the threshold for judgement of unrecognizableness, a predetermined rejection code and an image data corresponding to the unrecognizable character are
25 transmitted to the central control unit 120 via the wireless network 163.

On the other hand, in the central control unit 120,
first, the character recognition result receiver 122
receives the result of character recognition transmitted
from the mobile terminal 160. The result of character
5 recognition received is corrected by the character
recognition result post-processor 124, is stored by the
storage block 124a, and is processed like searching
data, stored in the storage block 124a, with using the
result of character recognition as a key. The
10 processing-result is displayed on the display unit 126.
Furthermore, according to the processing result on the
display unit 126, the processing result is edited with
using the input block 128.

Next, the processing executed in the sixth
15 embodiment will be described with reference to Figs. 15
and 16. In addition, here, in particular, the processing
executed in the character recognition block 166 and the
character recognition result post-processor 124 that are
important parts of the present invention will be
20 described in detail.

Fig. 15 is a flow chart showing the processing
executed in the character recognition block of the sixth
embodiment according to the present invention.

First, at step S200, the character recognition
25 block 166 in the mobile terminal 160 performs character
extraction in which characters are separated from the

image signal inputted from the scanner 164. Concretely,
relative coordinate values of the recognized object
character in the image signal are obtained. At step
S202, the character recognition block 166 performs
5 predetermined feature extraction from the character
separated at the step S200. At step S204, the block 166
calculates the similarity of the image signal of the
recognition object character to learned characters in
the recognition dictionary 166a on the basis of the
10 feature extracted at the step S202. At step S206, the
block 166 selects the predetermined number of
recognition candidate characters in the order of their
amount, and sorts the recognition candidate characters.
Furthermore, this number of recognition candidate
15 characters is set in a number-of-recognition-candidate-
characters register (not shown).

At step S208, the block 166 compares the similarity
of the first candidate of the recognition candidate
characters, that is, the recognition candidate character
20 having the largest similarity with the threshold for
judgement of unrecognizableness with using the
unrecognizableness judging block 166b. If the similarity
of the first candidate is less than the threshold for
judgement of unrecognizableness (NO at the step S208),
25 the process goes to step S210, where a predetermined
identifier, that is, a rejection code is outputted with

judging the recognition object character as an
unrecognizable character. In addition, the block 166
outputs also the image data corresponding to the
recognition object character at this time. On the other
5 hand, if the similarity of the first candidate is larger
than the threshold for judgement of unrecognizableness
(YES at the step S208), the process goes to step S212 as
successful recognition since it is possible to output at
least one result of character recognition.

10 At the step S212, two is substituted to a number-
of-recognition-candidate-characters counter i (not
shown) counting the number of the recognition candidate
characters processed. At step S214, it is judged whether
the content of the number-of-recognition-candidate-
15 characters counter i exceeds the number of recognition
candidate characters set in the number-of-recognition-
candidate-characters register. If the content of the
number-of-recognition-candidate-characters counter i
exceeds the number of recognition candidate characters
20 (YES at step S214), the subsequent processing is stopped
since there is no recognition candidate character over
the number. Then, the process goes to step S216. In
addition, at the step S216, all the character codes
corresponding to the recognition candidate characters
25 having similarity exceeding the threshold for judgement
of unrecognizableness are outputted. On the other hand,

if the content of the number-of-recognition-candidate-
characters counter i does not exceed the number of
recognition candidate characters (NO at the step S214),
the process goes to step S218.

5 At the step S218, the similarity of the ith
candidate is compared with the threshold for judgement
of unrecognizableness. If the similarity of the ith
candidate is less than the threshold for judgement of
unrecognizableness (NO at the step S218), the ith
10 candidate and subsequent candidates are judged as
unrecognizable characters. Then, the process goes to the
step S216. On the other hand, if the similarity of the
ith candidate is larger than the threshold for judgement
of unrecognizableness (YES at the step S218), the
15 process goes to step S220, where the number-of-
recognition-candidate-characters counter i is
incremented and the process returns to the step S214.

 In addition, the number-of-recognition-candidate-
characters register and number-of-recognition-candidate-
20 characters counter are implemented, for example, in the
RAM mounted in the central control unit 120, or are
constructed with dedicated hardware.

 Fig. 16 is a flow chart showing the processing
executed in the character recognition result post-
25 processor of the sixth embodiment of the present
invention.

At step S360, the character recognition result post-processor 124 judges whether the result of character recognition of the watched character is the rejection code on the basis of the result of character recognition received from the character recognition result receiver 122. If the result of character recognition is not the rejection code (NO at step S360, that is, the result of character recognition is a normal character code, the process goes to step S368 as no necessity of correction. On the other hand, if the result is the rejection code (YES at the step S360), the process goes to step S362 since the watched character should be corrected due to unrecognizableness. At the step S362, the post-processor 124 develops the image data that corresponds to the unrecognizable character and is sent with the rejection code in the working memory of the storage block 124a. At step S364, the post-processor 124 makes the image data developed in the working memory displayed on the display unit 126. By an operator observing the image data corresponding to the unrecognizable character, displayed on the display unit 126, at step S366, the post-processor 124 accepts a correction input of a correct solution character from the input block 128. At step S368, the post-processor 124 judges whether the watched character is the last result of character recognition among results of

character recognition received. If the watched character is not the last result of character recognition (No at the step S368), the process returns to the step S360. On the other hand, if being the last one (YES at the step

5 S368), the process is ended.

As described above, according to the sixth embodiment, in regard to a character, which is judged as a unrecognizable character by the character recognition block 166 of the mobile terminal 160, its image data is

10 transmitted with the rejection code to the central control unit 120. Owing to this, in the central control unit 120, it is possible to directly perform edition such as correction of the result of character recognition that becomes the rejection code as an

15 unrecognizable character. Therefore, it becomes possible to sharply increase processing efficiency in the character recognition result post-processor 124. Furthermore, since only the image data of an unrecognizable character is transmitted from the mobile

20 terminal 160 to the central control unit 120, it becomes possible to suppress the increase of communication load to a minimum.

Although the sixth embodiment has the construction of the mobile terminal 160 transmitting image data,

25 corresponding to a unrecognizable character, with a rejection code to the central control unit 120, the

present invention is not limited to this. For example,
the present invention can have the construction of
transmitting image data to the central control unit 120
after performing compression processing such as JPEG,
5 JBIG, and MMR in the mobile terminal 160, and
decompressing the image data compressed. In this case, a
data amount can be reduced.

Although, in the sixth embodiment, the number of
recognition candidate characters that the character
10 recognition block 166 of the mobile terminal 160 outputs
is plural, the present invention is not limited to this.
For example, with selecting a recognition candidate
character having the largest similarity as only one
recognition candidate character, the unrecognizableness
15 judging block 166b can perform judgement. In this case,
it becomes possible to accelerate the processing.

Although, in the sixth embodiment, the
communication system composed of the mobile terminal 160
and central control unit 120 that are connected via the
20 wireless network 136 is described, the present invention
is not limited to this. For example, there is no problem
even if a communication system is composed of terminals
and a central control unit that are connected via a
wired network internet, intranet and etc..

25 In addition, the present invention can be applied
to a system composed of plural equipment (for example, a

host computer, interface equipment, a reader, a printer, etc.), or single equipment (for example, a copy machine, a facsimile, etc.).

It is needless to say that the objects of the
5 present invention can be achieved by supplying to a system or equipment a recording medium where program code of software realizing the functions of the sixth embodiment described above is recorded, and by a
10 computer (or a CPU or a MPU) of the system or equipment reading and executing the program code recorded on the recording medium.

In this case, the program code itself, which is read from the recording medium, realizes the functions of the sixth embodiment described above, and the
15 recording medium, where the program code is recorded, constructs the present invention.

It is possible to use, for example, a floppy disk, a hard disk, an optical disk, a magneto-optical disk, a CD-ROM, a CD-R, a magnetic tape, a non-volatile memory
20 card, ROM, and the like as a recording medium for supplying the program code.

In addition, it is also needless to say that this includes a case that not only the functions of the embodiment described above are realized by the computer
25 executing the program code read, but also the functions of the sixth embodiment described above are realized by

an OS (operating system), which runs in the computer, performing a part or all of actual processing according to the instruction of the program code.

Furthermore, it is also needless to say that this
5 includes a case that the functions of the embodiment
described above are realized by a CPU, which is included
in a function enhancement board or a function
enhancement unit, performing a part or all of actual
processing on the basis of program code, after the
10 program code read from a recording medium is written in
memory provided in the function enhancement board
inserted in a computer or the function enhancement unit
connected to a computer.

WHAT IS CLAIMED IS:

1. A communication system that performs communication between a terminal and a central control
5 unit, said terminal comprising:
read means for reading a manuscript as image data;
character recognition means for performing character recognition from the image data, read by said read means, on the basis of a control signal; and
10 first communication means for transmitting a result of character recognition in said character recognition means to said central control unit or receiving said control signal from the central control unit;
said central control unit comprising:
15 second communication means for receiving the result of character recognition in said character recognition means from said terminal or transmitting said control signal to the terminal; and
control means for controlling said control signal
20 on the basis of the result of character recognition in said character recognition means, which said second communication means receives.

2. The communication system according to claim
25 1, wherein said character recognition means comprises:
judging means for outputting a recognition

candidate character corresponding to said image data with using a recognition dictionary, and judging on the basis of said control signal whether said recognition candidate character is unrecognizable,

5 wherein said character recognition means outputs the result of character recognition on the basis of the judgement result of said judging means.

3. The communication system according to claim
10 2, wherein said judging means judges whether the recognition candidate character is unrecognizable, by comparing said control signal with similarity of said recognition candidate character.

15 4. The communication system according to claim 2, wherein said judging means judges that the recognition candidate character is unrecognizable, if a value shown by said control signal is larger than the similarity of said recognition candidate character.

20 5. The communication system according to claim 4, wherein said character recognition means outputs a predetermined code showing unrecognizableness as a recognition result of said recognition candidate
25 character if the recognition candidate character is judged as a unrecognizable character as a result of

judgement of said judging means.

6. The communication system according to claim 5, wherein said control means decreases a value shown by said control signal to a value less than a current value if a number of said predetermined codes included in the result of character recognition by said character recognition means, which is received by said second communication means, is not less than a predetermined number.

7. The communication system according to claim 5, wherein said control means increases a value shown by said control signal to a value larger than a current value if a number of said predetermined codes included in the result of character recognition by said character recognition means, which is received by said second communication means, is less than a predetermined number.

8. A control method for a communication system that performs communication between a terminal and a central control unit, said control method comprising:
a read step of reading a manuscript as image data;
a character recognition step of performing character recognition from the image data, read at said

read step, on the basis of a control signal;

a first communication step of transmitting a result of character recognition at said character recognition step to said central control unit or receiving said
5 control signal from the central control unit;

a second communication step of receiving the result of character recognition at said character recognition step from said terminal or transmitting said control signal to the terminal; and

10 a control step of controlling said control signal on the basis of the result of character recognition at the character recognition step, which said second communication step receives.

15 9. The control method for the communication system according to claim 8, wherein said character recognition step comprises:

a judging step of outputting a recognition candidate character corresponding to said image data
20 with using a recognition dictionary, and judging on the basis of said control signal whether said recognition candidate character is unrecognizable,

wherein said character recognition step outputs the result of character recognition on the basis of the
25 judgement result at said judging step.

10. The control method for a communication system according to claim 9, where said judging step judges whether the recognition candidate character is unrecognizable, by comparing said control signal with
5 similarity of said recognition candidate character.

11. The control method for a communication system according to claim 9, wherein said judging step judges that said recognition candidate character is
10 unrecognizable, if a value shown by said control signal is larger than the similarity of the recognition candidate character.

12. The control method for a communication
15 system according to claim 11, wherein said character recognition step outputs a predetermined code showing unrecognizableness as a recognition result of said recognition candidate character if the recognition candidate character is judged as an unrecognizable
20 character as a result of judgement of said judging step.

13. The control method for a communication system according to claim 12, wherein said control step decreases a value shown by said control signal to a
25 value less than a current value if a number of said predetermined codes included in the result of character

recognition at said character recognition step, which is received at said second communication step, is not less than a predetermined number.

5 14. The control method for a communication system according to claim 12, wherein said control step increases a value shown by said control signal to a value larger than a current value if a number of said predetermined codes included in the result of character
10 recognition at said character recognition step, which is received at said second communication step, is less than a predetermined number.

 15. Computer-readable memory that stores
15 program code for controlling a communication system that performs communication between a terminal and a central control unit, said computer-readable memory comprising:

 program code for a read step of reading a manuscript as image data;

20 program code for a character recognition step of performing character recognition from image data, read at said read step, on the basis of a control signal;

 program code for a first communication step of transmitting a result of character recognition at said
25 character recognition step to said central control unit or receiving said control signal from the central

control unit;

program code for a second communication step of receiving the result of character recognition at said character recognition step from said terminal or

5 transmitting said control signal to the terminal; and

program code for a control step of controlling said control signal on the basis of the result of character recognition at said character recognition step, which said second communication step receives.

10

16. A communication system that performs communication between a terminal and a central control unit, said terminal comprising:

read means for reading a manuscript, including a
15 manuscript ID showing a kind of the manuscript, as image data;

storage means for storing a recognition dictionary group whose members each correspond to each attribute of data;

20 character recognition means for performing character recognition from image data, read by said read means, with selecting a recognition dictionary, based on a control signal, from the recognition dictionary group, stored in said storage means;

25 manuscript ID recognition means for recognizing said manuscript ID from said image data; and

first communication means for transmitting a result
of character recognition in said character recognition
means and a result of manuscript ID recognition in said
manuscript ID recognition means to said central control
5 unit or receiving said control signal from the central
control unit;

said central control unit comprising:

second communication means for receiving the result
of character recognition in said character recognition
10 means and the result of manuscript ID recognition in
said manuscript ID recognition means from said terminal
or transmitting said control signal to the terminal; and

control means for controlling said control signal
on the basis of the result of manuscript ID recognition
15 in said manuscript ID recognition means, which said
second communication means receives.

17. The communication system according to claim
16, wherein said character recognition means determines
20 recognition candidate characters corresponding to said
image data with using a recognition dictionary based on
said control signal and outputs a predetermined number
of recognition candidate characters in the order
according to largeness of similarity of the recognition
25 candidate characters.

18. The communication system according to claim 16, wherein said control means comprises a database managing said control signal every kind of a manuscript that is shown by a manuscript ID and obtains from said database a control signal corresponding to a manuscript ID shown by the result of manuscript ID recognition in said manuscript ID recognition means.

19. The communication system according to claim 16, wherein said control signal includes positional information, showing each of plural recognition area in said image data, and recognition dictionary information showing a recognition dictionary used for recognition in each recognition area.

15

20. A control method for a communication system that performs communication between a terminal and a central control unit, said control method comprising:

a read step of reading a manuscript, including a manuscript ID showing a kind of the manuscript, as image data;

a character recognition step of performing character recognition from image data, read at said read step, with selecting a recognition dictionary, based on a control signal, from a recognition dictionary group whose members each correspond to each attribute of the

image data;

a manuscript ID recognition step of recognizing
said manuscript ID from said image data;

a first communication step of transmitting a result
5 of character recognition at said character recognition
step and a result of manuscript ID recognition at said
manuscript ID recognition step to said central control
unit or receiving said control signal from the central
control unit;

10 a second communication step of receiving the result
of character recognition at said character recognition
step and the result of manuscript ID recognition at said
manuscript ID recognition step from said terminal or
transmitting said control signal to the terminal; and

15 a control step of controlling said control signal
on the basis of the result of manuscript ID recognition
at said manuscript ID recognition step, which said
second communication step receives.

20 21. The control method for a communication
system according to claim 20, wherein said character
recognition step determines recognition candidate
characters to said image data with using a recognition
dictionary based on said control signal and outputs a
25 predetermined number of recognition candidate characters
in the order according to largeness of similarity of the

recognition candidate characters.

22. The control method for a communication system according to claim 20, wherein said control step
5 obtains from the database a control signal corresponding to a manuscript ID shown by the result of manuscript ID recognition at said manuscript ID recognition step.

23. The control method for a communication
10 system according to claim 20, wherein said control signal includes positional information, showing each of plural recognition area in said image data, and recognition dictionary information showing a recognition dictionary used for recognition in each recognition
15 area.

24. Computer-readable memory that stores program code for controlling a communication system that performs communication between a terminal and a central
20 control unit, said computer-readable memory comprising:
program code for a read step of reading a manuscript, including a manuscript ID showing a kind of the manuscript, as image data;
program code for a character recognition step of
25 performing character recognition from image data, read at said read step, with selecting a recognition

dictionary whose members each correspond to each attribute of the data, on the basis of a control signal;

program code for a manuscript ID recognition step of recognizing said manuscript ID from said image data;

5 program code for a first communication step of transmitting a result of character recognition at said character recognition step and a result of manuscript ID recognition at said manuscript ID recognition step to said central control unit or receiving said control
10 signal from the central control unit;

program code for a second communication step of receiving the result of character recognition at said character recognition step and the result of manuscript ID recognition at said manuscript ID recognition step
15 from said terminal or transmitting said control signal to the terminal; and

program code for a control step of controlling said control signal on the basis of the result of manuscript ID recognition at said manuscript ID recognition step,
20 which said second communication step receives.

25. A communication system that performs communication between a terminal and a central control unit, said terminal comprising:

25 read means for reading a manuscript as image data;
character recognition means for performing

character recognition from image data, read by the read means, on the basis of a control signal; and

first communication means for transmitting a result of character recognition in said character recognition means to said central control unit or receiving said control signal from the central control unit;

said central control unit comprising:

input means for inputting said control signal; and

second communication means for receiving the result of character recognition in said character recognition means from said terminal or transmitting the control signal inputted from said input means to the terminal.

26. The communication system according to claim 25, wherein said character recognition means comprises judging means that outputs a recognition candidate character to said image data with using a recognition dictionary and judges on the basis of said control signal whether said recognition candidate character is unrecognizable, and

wherein said character recognition means outputs the result of character recognition on the basis of a judgement result of said judging means.

27. The communication system according to claim 25, wherein said judging means judges whether said

recognition candidate character is unrecognizable, by
comparing said control signal with similarity of the
recognition candidate character.

5 28. The communication system according to claim
25, wherein said character recognition means outputs a
predetermined code showing unrecognizableness as a
recognition result of said recognition candidate
character if the recognition candidate character is
10 unrecognizable as a result of judgement of said judging
means.

29. The communication system according to claim
25, wherein said central control unit comprises display
15 means displaying information relating to the result of
character recognition in said character recognition
means that is received in said second communication
means, and

wherein a control signal for obtaining desired
20 recognition accuracy is inputted by a user from said
display means on the basis of information displayed on
said display means.

30. A control method for a communication system
25 that performs communication between a terminal and a
central control unit, said control method comprising:

a read step of reading a manuscript as image data;
a character recognition step of performing
character recognition from the image data, read at said
read step, on the basis of a control signal;

5 a first communication step of transmitting a result
of character recognition at said character recognition
step to said central control unit or receiving said
control signal from the central control unit;

10 an input step of inputting said control signal; and
a second communication step of receiving the result
of character recognition at said character recognition
step from said terminal or transmitting the control
signal, inputted at said input step to the terminal.

15 31. The control method for a communication
system according to claim 30, wherein said character
recognition step comprises a judging step of outputting
a recognition candidate character corresponding to said
image data with using a recognition dictionary and
20 judging on the basis of said control signal whether said
recognition candidate character is unrecognizable, and

wherein said character recognition step outputs the
result of character recognition on the basis of a
judgement result at said judging step.

25

32. The control method for a communication

system according to claim 31, wherein said judging step judges whether said recognition candidate character is unrecognizable, by comparing said control signal with similarity of the recognition candidate character.

5

33. The control method for a communication system according to claim 31, wherein said character recognition step outputs a predetermined code showing unrecognizableness as a recognition result of said
10 recognition candidate character if the recognition candidate character is unrecognizable as a result of judgement at said judging step.

34. The control method for a communication
15 system according to claim 30, wherein said central control unit comprises a display step displaying information, relating to the result of character recognition at said character recognition step that is received at said second communication step, on a display
20 unit, and

wherein a control signal for obtaining desired recognition accuracy is inputted by a user at said input step on the basis of information displayed on said display unit at said display step.

25

35. Computer-readable memory that stores

program code for controlling a communication system that performs communication between a terminal and a central control unit, said computer-readable memory comprising:

- program code for a read step of reading a manuscript as image data;
- program code for a character recognition step of performing character recognition from image data, read at said read step, on the basis of a control signal;
- program code for a first communication step of transmitting a result of character recognition at said character recognition step to said central control unit or receiving said control signal from the central control unit;
- program code for an input step of inputting said control signal; and
- program code for a second communication step of receiving the result of character recognition at said character recognition step from said terminal or transmitting the control signal, which is inputted at said input step, to the terminal.

36. A communication system that performs communication between a terminal and a central control unit, said terminal comprising:

- read means for reading a manuscript, including a manuscript ID showing a kind of the manuscript, as image

data;

character recognition means for performing character recognition from the image data, read by said read means, on the basis of a control signal;

5 manuscript ID recognition means for recognizing said manuscript ID from said image data; and

first communication means for transmitting a result of character recognition in said character recognition means and a result of manuscript ID recognition in said manuscript ID recognition means to said central control unit or receiving said control signal from the central control unit;

said central control unit comprising:

second communication means for receiving the result of character recognition in said character recognition means and the result of manuscript ID recognition in said manuscript ID recognition means from said terminal or transmitting said control signal to the terminal; and

control means for controlling said control signal on the basis of the result of manuscript ID recognition in said manuscript ID recognition means, which said second communication means receives.

37. The communication system according to claim 25 36, wherein said character recognition means comprises judging means that outputs a recognition candidate

character corresponding to said image data with using a recognition dictionary and judges on the basis of said control signal whether said recognition candidate character is unrecognizable, and

5 wherein said character recognition means outputs the result of character recognition on the basis of a judgement result of said judging means.

38. The communication system according to claim
10 37, wherein said judging means judges whether said recognition candidate character is unrecognizable, by comparing said control signal with similarity of said recognition candidate character.

15 39. The communication system according to claim 37, wherein said judging means judges that said image data is unrecognizable, if a value shown by said control signal is larger than the similarity of said recognition candidate character.

20

40. The communication system according to claim 39, wherein said character recognition means outputs a predetermined code showing unrecognizableness as a recognition result of said recognition candidate
25 character if the recognition candidate character is unrecognizable as a result of judgement of said judging

means.

41. The communication system according to claim
40, wherein said control means comprises a database
5 managing said control signal every kind of a manuscript
that is shown by a manuscript ID, and

wherein said control means obtains from said
database a control signal corresponding to a manuscript
ID shown by the result of manuscript ID recognition in
10 said manuscript ID recognition means.

42. The communication system according to claim
1, wherein said control signal includes positional
information, showing each of plural recognition area in
15 said manuscript, and a threshold for judgement of
unrecognizableness in each recognition area.

43. A control method for a communication system
that performs communication between a terminal and a
20 central control unit, said control method comprising:

a read step of reading a manuscript, including a
manuscript ID showing a kind of the manuscript, as image
data;

a character recognition step of performing
25 character recognition from image data, read at said read
step, on the basis of a control signal;

a manuscript ID recognition step of recognizing
said manuscript ID from said image data; and

a first communication step of transmitting a result
of character recognition at said character recognition
5 step and a result of manuscript ID recognition at said
manuscript ID recognition step to said central control
unit or receiving said control signal from the central
control unit;

a second communication step of receiving the result
10 of character recognition at said character recognition
step and the result of manuscript ID recognition at said
manuscript ID recognition step from said terminal or
transmitting said control signal to the terminal; and

a control step of controlling said control signal
15 on the basis of the result of manuscript ID recognition
at said manuscript ID recognition step, which said
second communication step receives.

44. The control method for a communication
20 system according to claim 43, wherein said character
recognition step comprises a judging step of outputting
a recognition candidate character corresponding to said
image data with using a recognition dictionary and
judging on the basis of said control signal whether said
25 image data is unrecognizable, and

wherein said character recognition step outputs the

result of character recognition on the basis of a judgement result at said judging step.

45. The control method for a communication system according to claim 44, wherein said judging step judges whether said image data is unrecognizable, by comparing said control signal with similarity of said recognition candidate character.

46. The control method for a communication system according to claim 44, wherein said judging step judges that said image data is unrecognizable, if a value shown by said control signal is larger than the similarity of said recognition candidate character.

47. The control method for a communication system according to claim 46, wherein said character recognition step outputs a predetermined code showing unrecognizableness as a recognition result of said recognition candidate character, if said image data is unrecognizable as a result of judgement at said judging step.

48. The control method for a communication system according to claim 47, wherein said control step obtains a control signal corresponding to a manuscript

ID shown by the result of manuscript ID recognition at said manuscript ID recognition step from a database managing said control signal every kind of the manuscript shown by said manuscript ID.

5

49. The control method for a communication system according to claim 43, wherein said control signal includes positional information, showing each of plural recognition area in said manuscript, and a
10 threshold for judgement of unrecognizableness in each recognition area.

50. Computer-readable memory that stores program code for controlling a communication system that
15 performs communication between a terminal and a central control unit, said computer-readable memory comprising:

program code for a read step of reading a manuscript, including a manuscript ID showing a kind of the manuscript, as image data;

20 program code for a character recognition step of performing character recognition from the image data, read at said read step, on the basis of a control signal;

program code for a manuscript ID recognition step
25 of recognizing the manuscript ID from said image data; and

program code for a first communication step of transmitting a result of character recognition at said character recognition step and a result of manuscript ID recognition at said manuscript ID recognition step to
5 said central control unit or receiving said control signal from the central control unit;

program code for a second communication step of receiving the result of character recognition at said character recognition step and the result of manuscript
10 ID recognition at said manuscript ID recognition step from said terminal or transmitting said control signal to the terminal; and

program code for a control step of controlling said control signal on the basis of the result of manuscript
15 ID recognition at said manuscript ID recognition step, which said second communication step receives.

51. A communication system that performs communication between a terminal and a central control
20 unit, said terminal comprising:

read means for reading a manuscript as image data;
character recognition means for dividing image data, read by said read means, into recognition areas each having the same attribute and performing character
25 recognition every recognition area, being divided, on the basis of a control signal corresponding to each

recognition area divided; and

first communication means for transmitting
positional information, showing the recognition areas
respectively, and a result of character recognition
5 every recognition area to said central control unit or
receiving said control signal from the central control
unit;

said central control unit comprising:

second communication means for receiving the
10 positional information, showing said recognition areas
respectively, and the result of character recognition
every recognition area from said terminal or
transmitting said control signal to the terminal; and

control means for controlling the control signal
15 every recognition area on the basis of the positional
information, showing the recognition areas respectively,
and the result of character recognition every
recognition area, which said second communication means
receives.

20

52. The communication system according to claim
51, wherein said character recognition means comprises
judging means that outputs a recognition candidate
character corresponding to each of said recognition
25 areas with using a recognition dictionary and judges on
the basis of said control signal, corresponding to each

of the recognition areas, whether the image data in the recognition area is unrecognizable, and

wherein said character recognition means outputs the result of character recognition on the basis of a judgement result of said judging means.

53. The communication system according to claim 52, wherein said judging means judges whether the image data is unrecognizable, by comparing said control signal with similarity of said recognition candidate character.

54. The communication system according to claim 52, wherein said judging means judges that the image data is unrecognizable, if a value shown by said control signal is larger than the similarity of said recognition candidate character.

55. The communication system according to claim 54, wherein said character recognition means outputs a predetermined code showing unrecognizableness as a recognition result of said recognition candidate character if the image data in said recognition area is unrecognizable as a result of judgement of said judging means.

56. The communication system according to claim

55, wherein said control means decreases a value shown
by said control signal to a value less than a current
value if a number of said predetermined codes included
in the result of character recognition by said character
5 recognition means, which is received by said second
communication means, is not less than a predetermined
number.

57. The communication system according to claim
10 55, wherein said control means increases a value shown
by said control signal to a value larger than a current
value if a number of said predetermined codes included
in the result of character recognition by said character
recognition means, which is received by said second
15 communication means, is less than a predetermined
number.

58. A control method for a communication system
that performs communication between a terminal and a
20 central control unit, said control method comprising:
a read step of reading a manuscript as image data;
a character recognition step of dividing image
data, read at said read step, into recognition areas
each having the same attribute and performing character
25 recognition every recognition area, being divided, on
the basis of a corresponding control signal;

a first communication step of transmitting
positional information, showing the recognition areas
respectively, and a result of character recognition
every recognition area to said central control unit or
5 receiving said control signal from the central control
unit;

a second communication step of receiving the
positional information, showing the recognition areas
respectively, and the result of character recognition
10 every recognition area from said terminal or
transmitting said control signal to the terminal; and

a control step of controlling the control signal
every recognition area on the basis of the positional
information, showing said recognition areas
15 respectively, and the result of character recognition
every recognition area, which said second communication
step receives.

59. The control method for a communication
20 system according to claim 58, wherein said character
recognition step comprises judging step that outputs a
recognition candidate character corresponding to each of
said recognition areas with using a recognition
dictionary and judges on the basis of said control
25 signal, corresponding to each of the recognition areas,
whether the image data in the recognition area is

unrecognizable, and

wherein said character recognition step outputs the result of character recognition on the basis of a judgement result of said judging step.

5

60. The control method for a communication system according to claim 59, wherein said judging step judges whether the image data in said recognition area is unrecognizable, by comparing said control signal with
10 similarity of said recognition candidate character.

61. The control method for a communication system according to claim 59, wherein said judging step judges that the image data in said recognition area is
15 unrecognizable, if a value shown by said control signal is larger than the similarity of said recognition candidate character.

62. The control method for a communication
20 system according to claim 61, wherein said character recognition step outputs a predetermined code showing unrecognizableness as a recognition result corresponding to the recognition candidate character if the image data in said recognition area is unrecognizable as a result
25 of judgement at said judging step.

63. The control method for a communication system according to claim 62, wherein said control step decreases a value shown by said control signal to a value less than a current value if a number of said
5 predetermined codes included in the result of character recognition at said character recognition step, which is received by said second communication step, is not less than a predetermined number.

10 64. The control method for a communication system according to claim 62, wherein said control step increases a value shown by said control signal to a value larger than a current value if a number of said
15 predetermined codes included in the result of character recognition at said character recognition step, which is received at said second communication step, is less than a predetermined number.

65. Computer-readable memory that stores
20 program code for controlling a communication system that performs communication between a terminal and a central control unit, said computer-readable memory comprising:
program code for a read step of reading a manuscript as image data;
25 program code for a character recognition step of dividing image data, read at said read step, into

recognition areas each having the same attribute and performing character recognition every recognition area, being divided, on the basis of a corresponding control signal;

5 program code for a first communication step of transmitting positional information, showing said recognition areas respectively, and a result of character recognition every recognition area to said central control unit or receiving said control signal
10 from the central control unit;

 program code for a second communication step of receiving the positional information, showing said recognition areas respectively, and the result of character recognition every recognition area from said
15 terminal or transmitting said control signal to the terminal; and

 program code for a control step of controlling the control signal every recognition area on the basis of the positional information, showing said recognition
20 areas respectively, and the result of character recognition every recognition area, which said second communication step receives.

66. A communication system that performs
25 communication between a terminal and a central control unit, said terminal comprising:

read means for reading a manuscript as image data;
character recognition means for performing
character recognition from image data read by said read
means; and

5 first communication means for transmitting a result
of character recognition in said character recognition
means to said central control unit;

said central control unit comprising:

second communication means for receiving the result
10 of character recognition in said character recognition
means from said terminal;

display means for displaying the result of
character recognition in said character recognition
means, which said second communication means receives;

15 input means for inputting an instruction for
performing processing to said result of character
recognition; and

post-processing means for performing post-
processing of said result of character recognition on
20 the basis of an input with said input means.

67. The communication system according to claim
66, wherein said character recognition means comprises
judging means that outputs a recognition candidate
25 character corresponding to said image data with using a
recognition dictionary and judges on the basis of said

control signal whether said image data is
unrecognizable, and

wherein said character recognition means outputs
the result of character recognition on the basis of a
5 judgement result of said judging means.

68. The communication system according to claim
67, wherein said judging means judges whether said image
data is unrecognizable, by comparing said control signal
10 with similarity of said recognition candidate character.

69. The communication system according to claim
67, wherein said judging means judges that said image
data is unrecognizable, if a value shown by said control
15 signal is larger than the similarity of said recognition
candidate character.

70. The communication system according to claim
67, wherein said character recognition means outputs a
20 predetermined code showing unrecognizableness as a
recognition result of said recognition candidate
character if said image data is unrecognizable as a
result of judgement of said judging means.

25 71. The communication system according to claim
67, wherein said first communication means transmits

image data with said result of character recognition if the image data, which is judged as being unrecognizable by said judging means, exists.

- 5 72. A control method for a communication system that performs communication between a terminal and a central control unit, said control method comprising:
- a read step of reading a manuscript as image data;
 - a character recognition step of performing
 - 10 character recognition from image data read at said read step;
 - a first communication step of transmitting a result of character recognition at the character recognition step to said central control unit;
 - 15 a second communication step of receiving the result of character recognition at said character recognition step from said terminal;
 - a display step for displaying the result of character recognition at said character recognition
 - 20 step, which is received at said second communication step;
 - an input step of inputting an instruction for performing processing of said result of character recognition; and
 - 25 a post-processing step for performing post-processing of said result of character recognition on

the basis of an input at said input step.

73. The control method for a communication system according to claim 72, wherein said character
5 recognition step comprises judging step that outputs a recognition candidate character corresponding to said image data with using a recognition dictionary and judges on the basis of said control signal whether said image data is unrecognizable, and

10 wherein said character recognition step outputs the result of character recognition on the basis of a judgement result at said judging step.

74. The control method for a communication
15 system according to claim 73, wherein said judging step judges whether said image data is unrecognizable, by comparing said control signal with similarity of said recognition candidate character.

20 75. The control method for a communication system according to claim 73, wherein said judging step judges that said image data is unrecognizable, if a value shown by said control signal is larger than the similarity of said recognition candidate character.

25 76. The control method for a communication

system according to claim 73, wherein said character
recognition step outputs a predetermined code showing
unrecognizableness as a recognition result corresponding
to the recognition candidate character if said image
5 data is unrecognizable as a result of judgement at said
judging step.

77. The control method for a communication
system according to claim 73, wherein said first
10 communication step transmits image data with said result
of character recognition if the image data, which is
judged as being unrecognizable at said judging step,
exists.

78. Computer-readable memory that stores
program code for controlling a communication system that
performs communication between a terminal and a central
control unit, said computer-readable memory comprising:

program code for a read step of reading a
20 manuscript as image data;

program code for a character recognition step of
performing character recognition from image data read at
said read step;

program code for a first communication step of
25 transmitting a result of character recognition at said
character recognition step to said central control unit;

program code for a second communication step of receiving the result of character recognition at said character recognition step from said terminal;

5 program code for a display step for displaying the result of character recognition at said character recognition step, which is received at said second communication step;

10 program code for an input step of inputting an instruction for performing processing of said result of character recognition; and

program code for a post-processing step for performing post-processing of said result of character recognition on the basis of an input at said input step.

ABSTRACT OF THE DISCLOSURE

A mobile terminal reads a read manuscript as image data. A character recognition block performs character
5 recognition from the image data, which is read, on the basis of a threshold for judgement of unrecognizableness. A character recognition result is transmitted to a central control unit, or the threshold for judgement of unrecognizableness is received from the
10 central control unit in a threshold receiver. On the other hand, the central control unit receives the result of character recognition from the mobile terminal, or transmits the threshold for judgement of unrecognizableness from a threshold transmitter to the
15 mobile terminal. Furthermore, the central control unit controls the threshold for judgement of unrecognizableness with a threshold controller.

FIG. 1

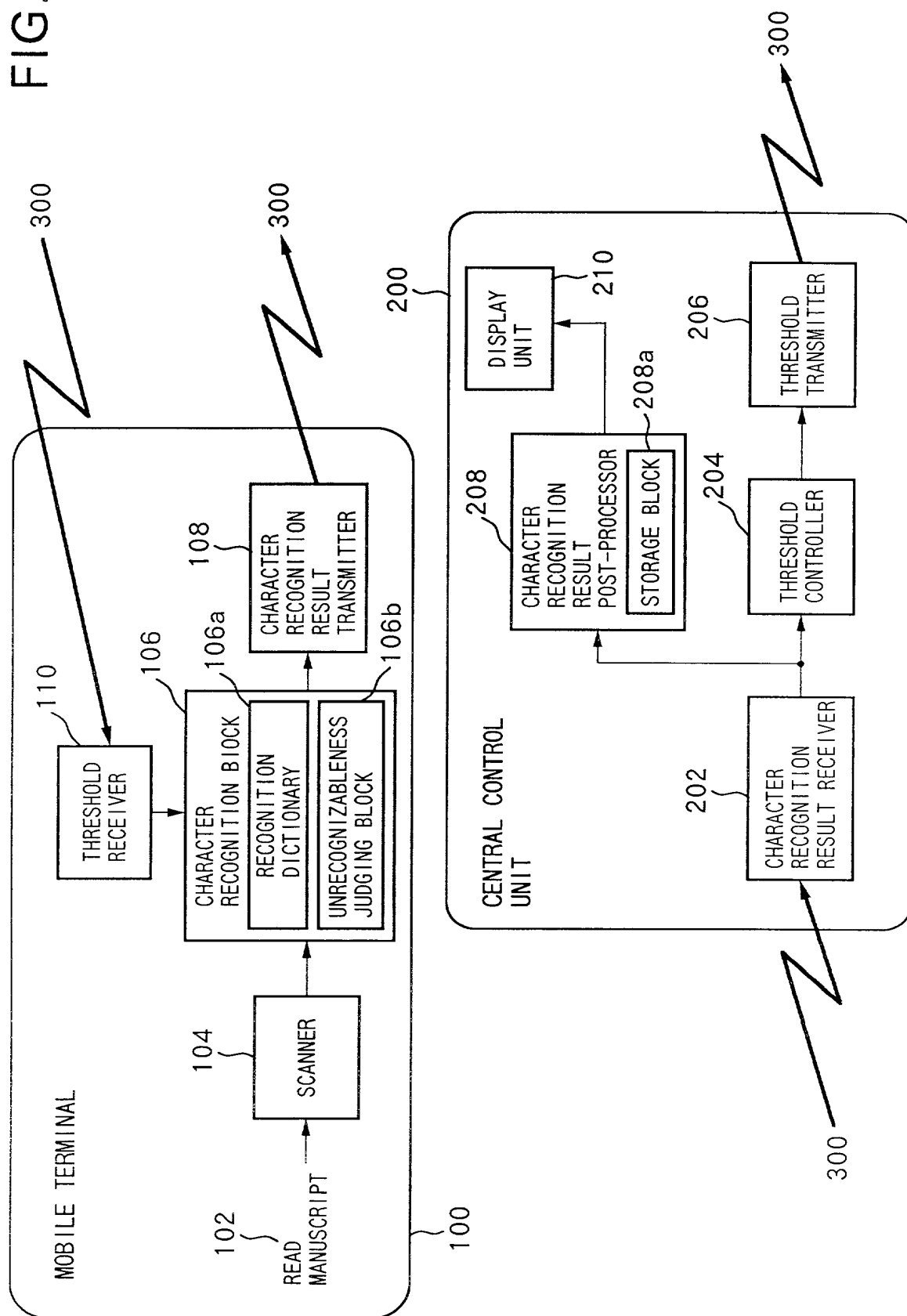


FIG.2

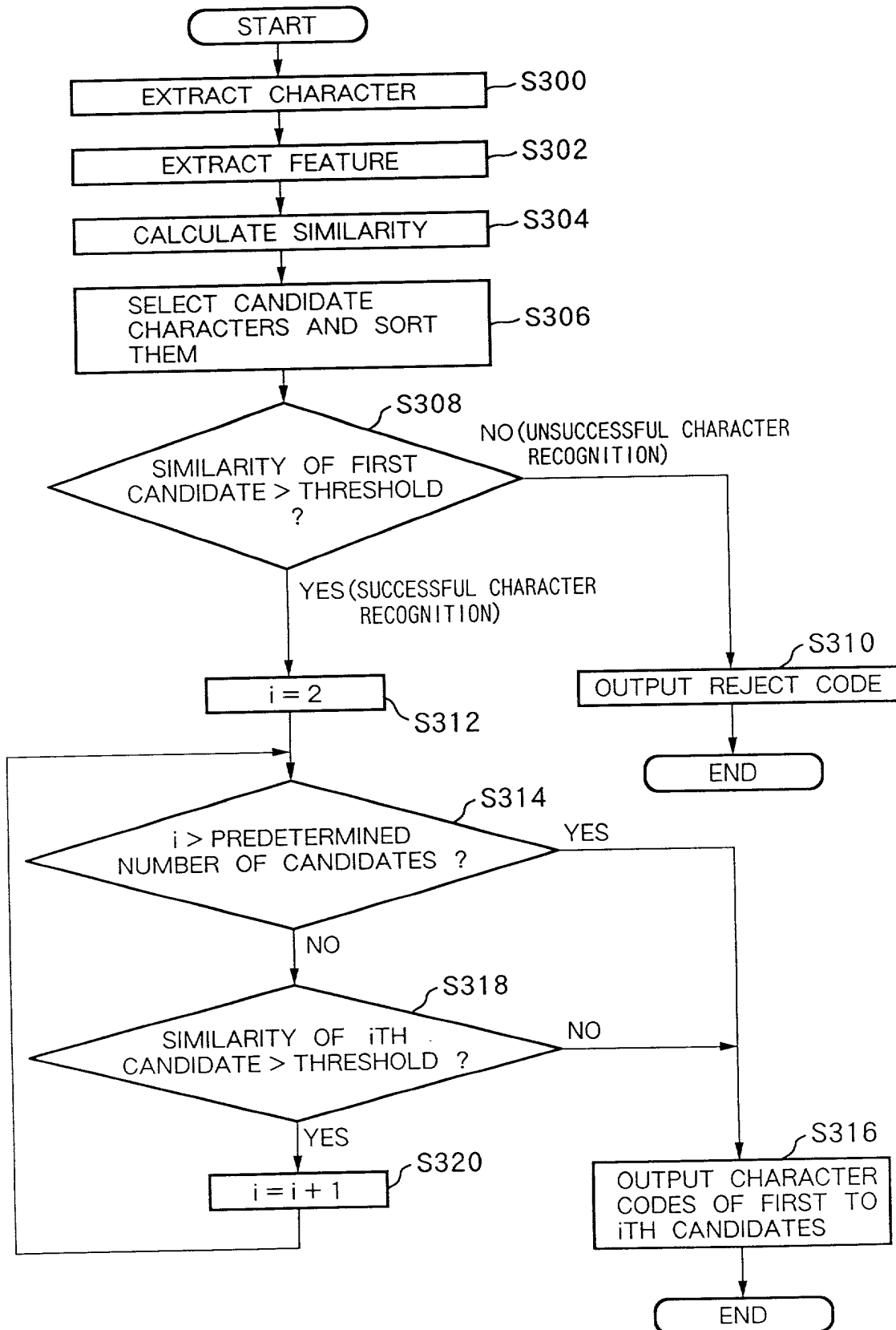
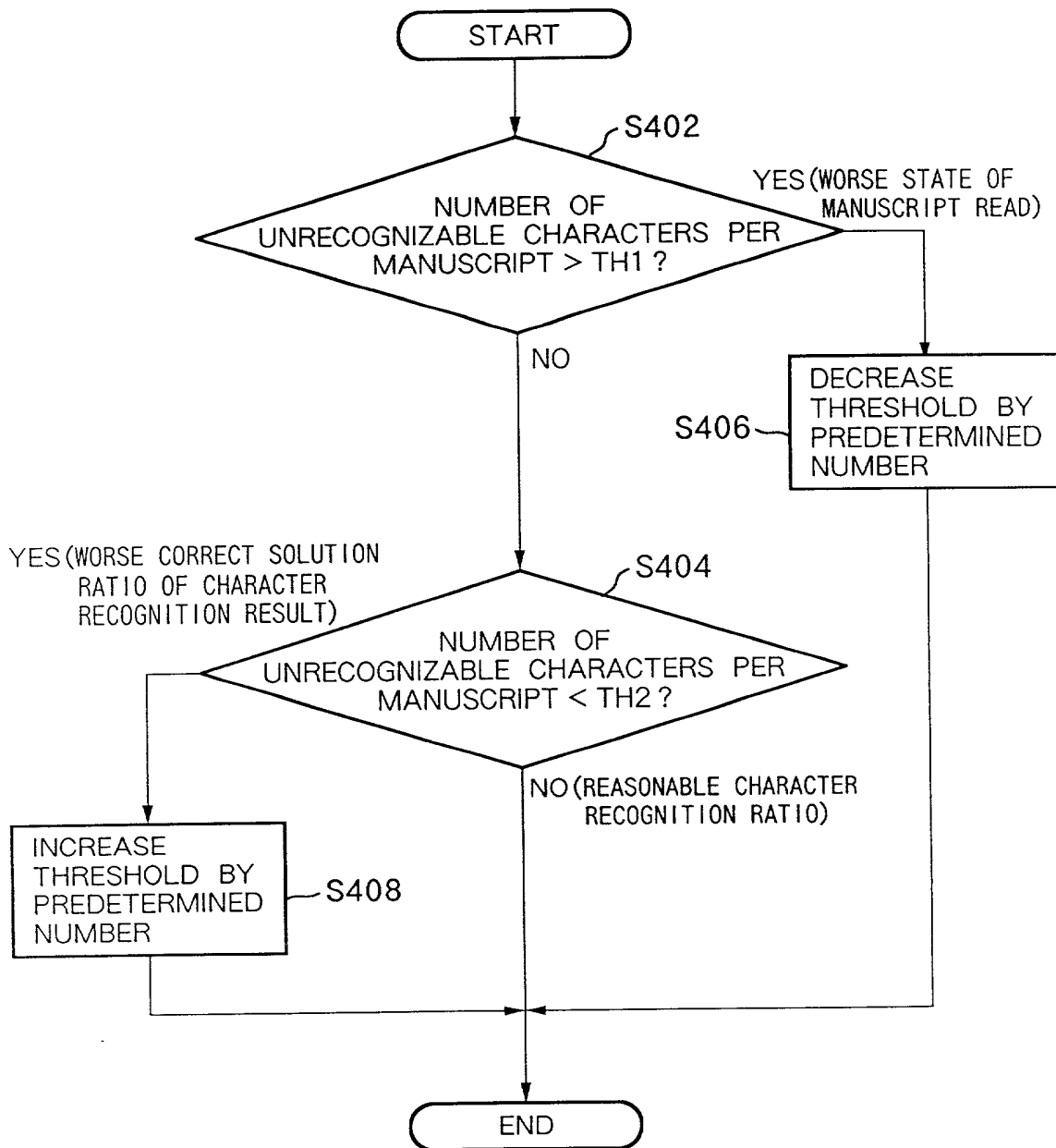


FIG.3



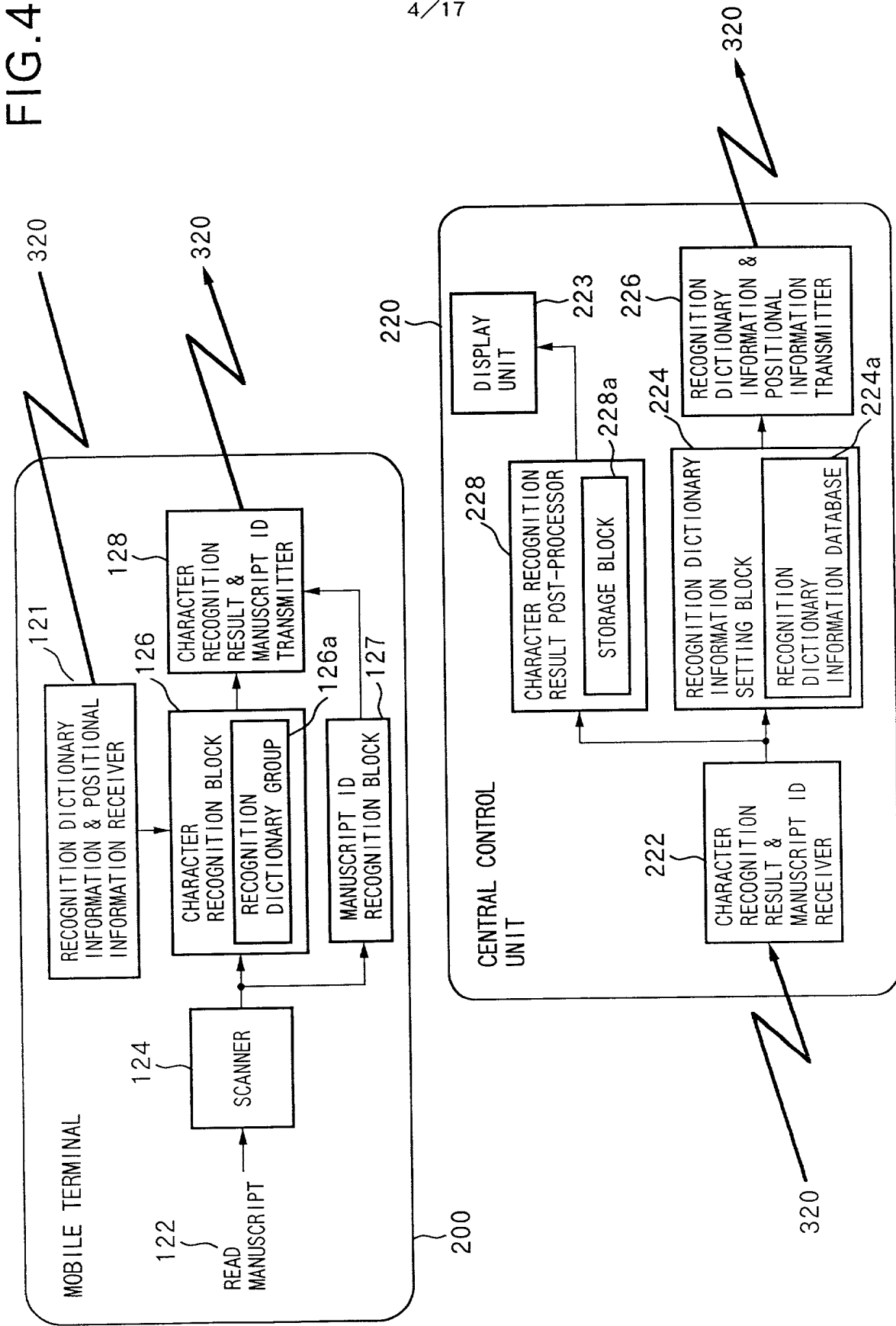


FIG.5

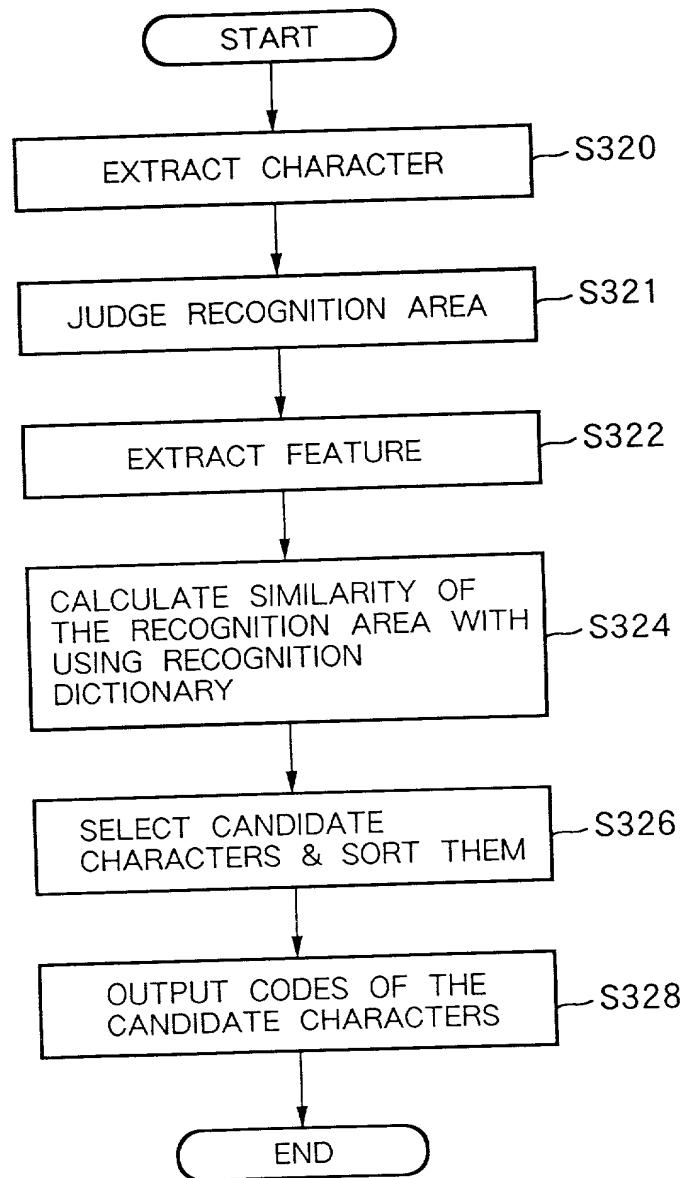


FIG.6

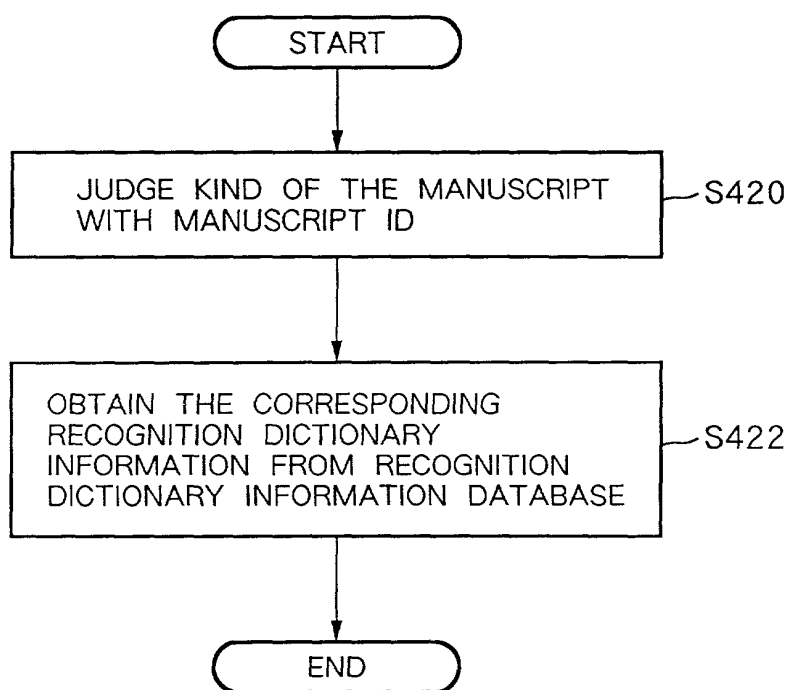
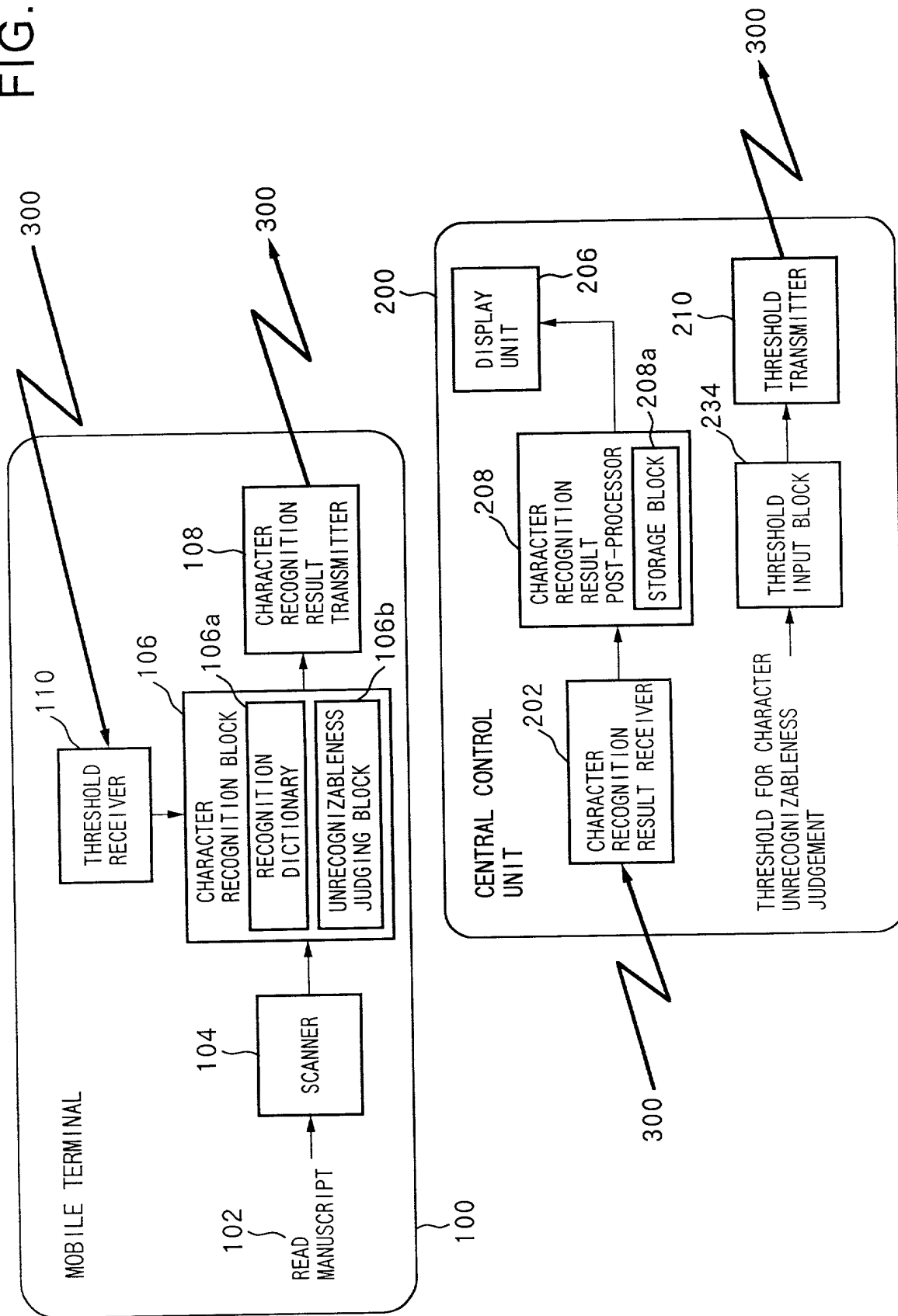


FIG. 7



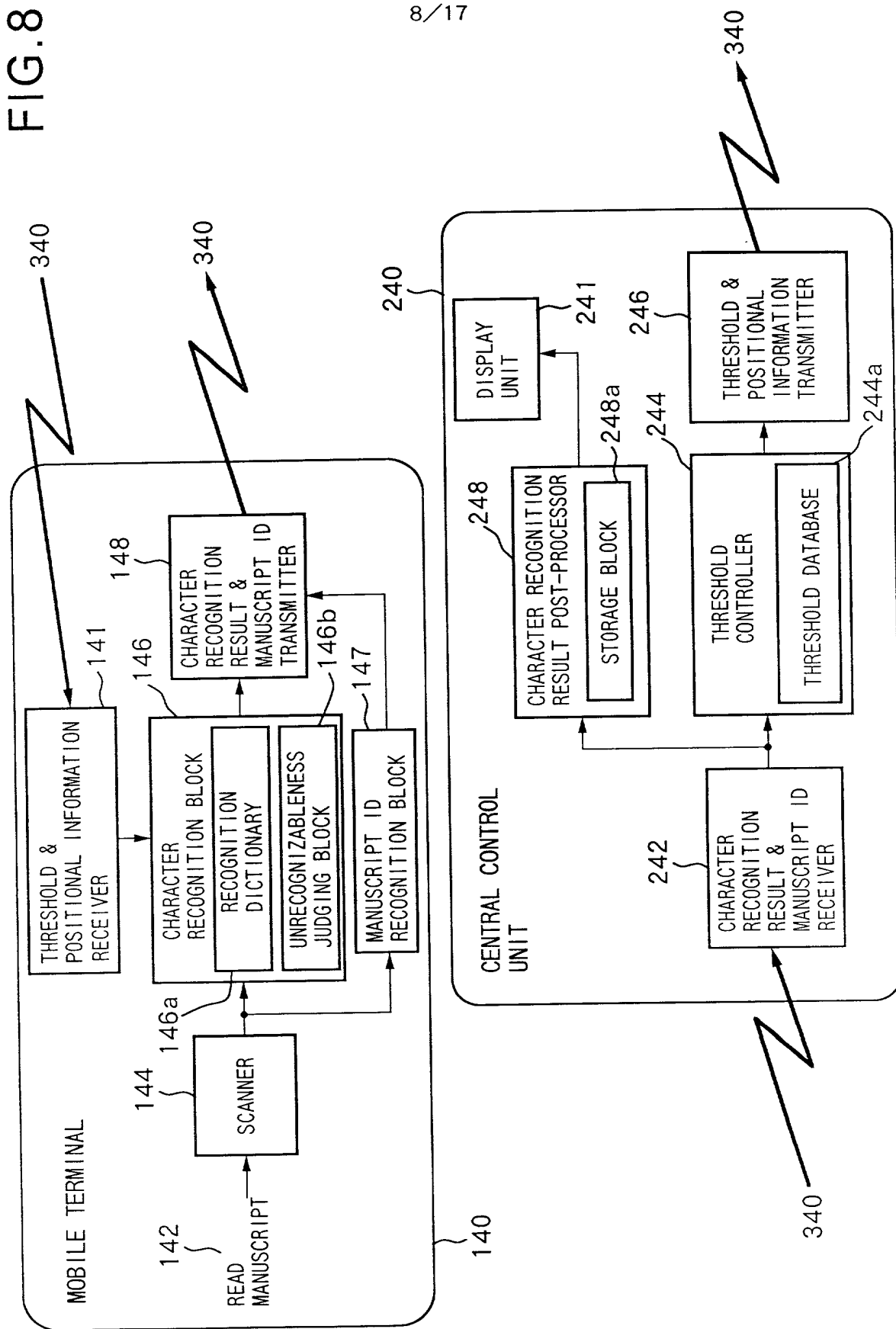


FIG. 9

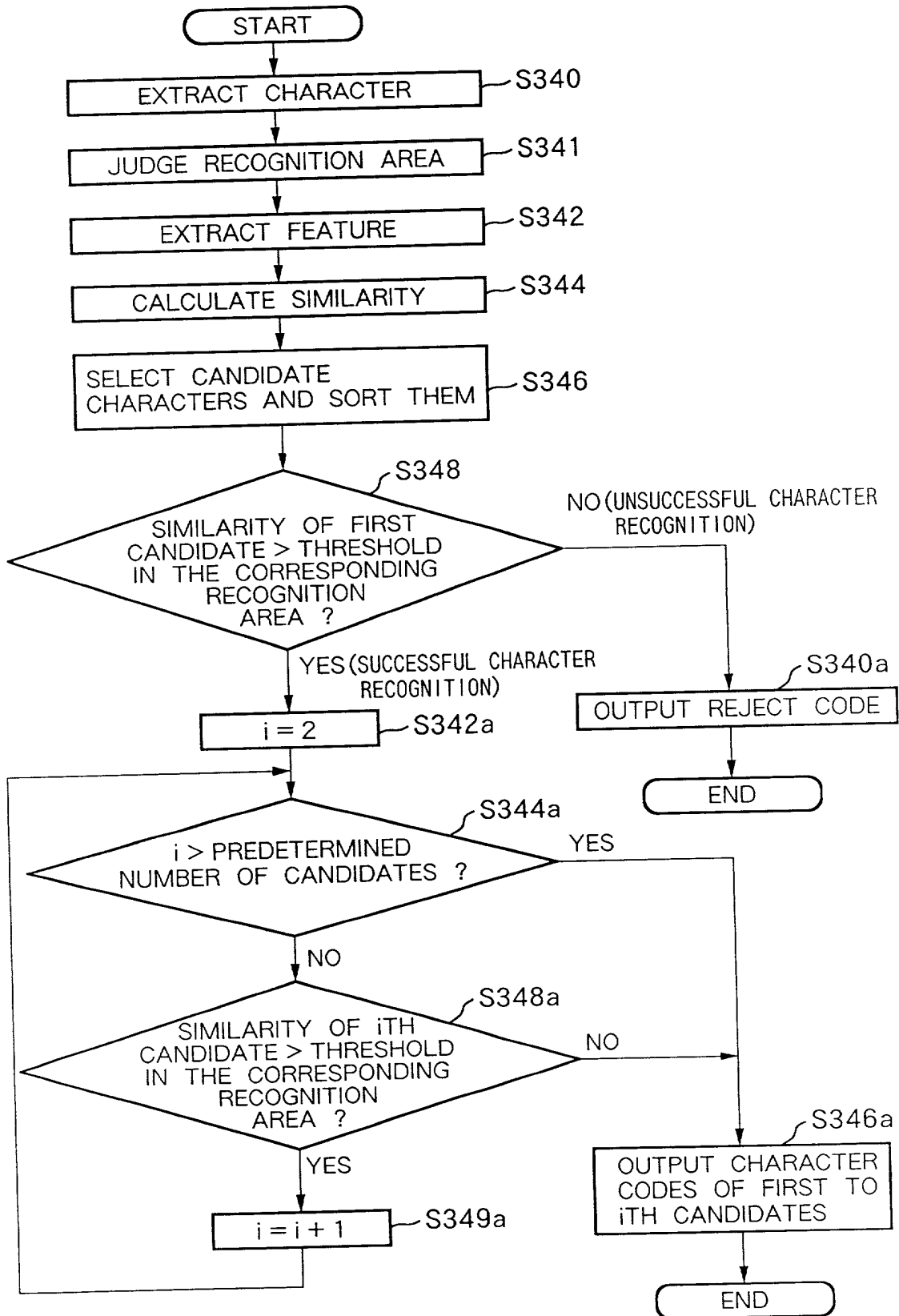


FIG.10

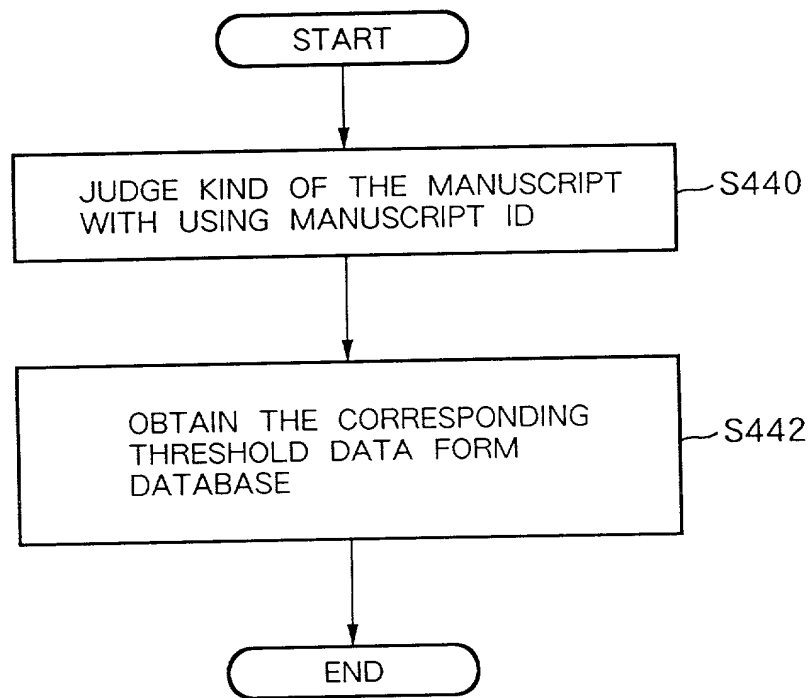


FIG. 11

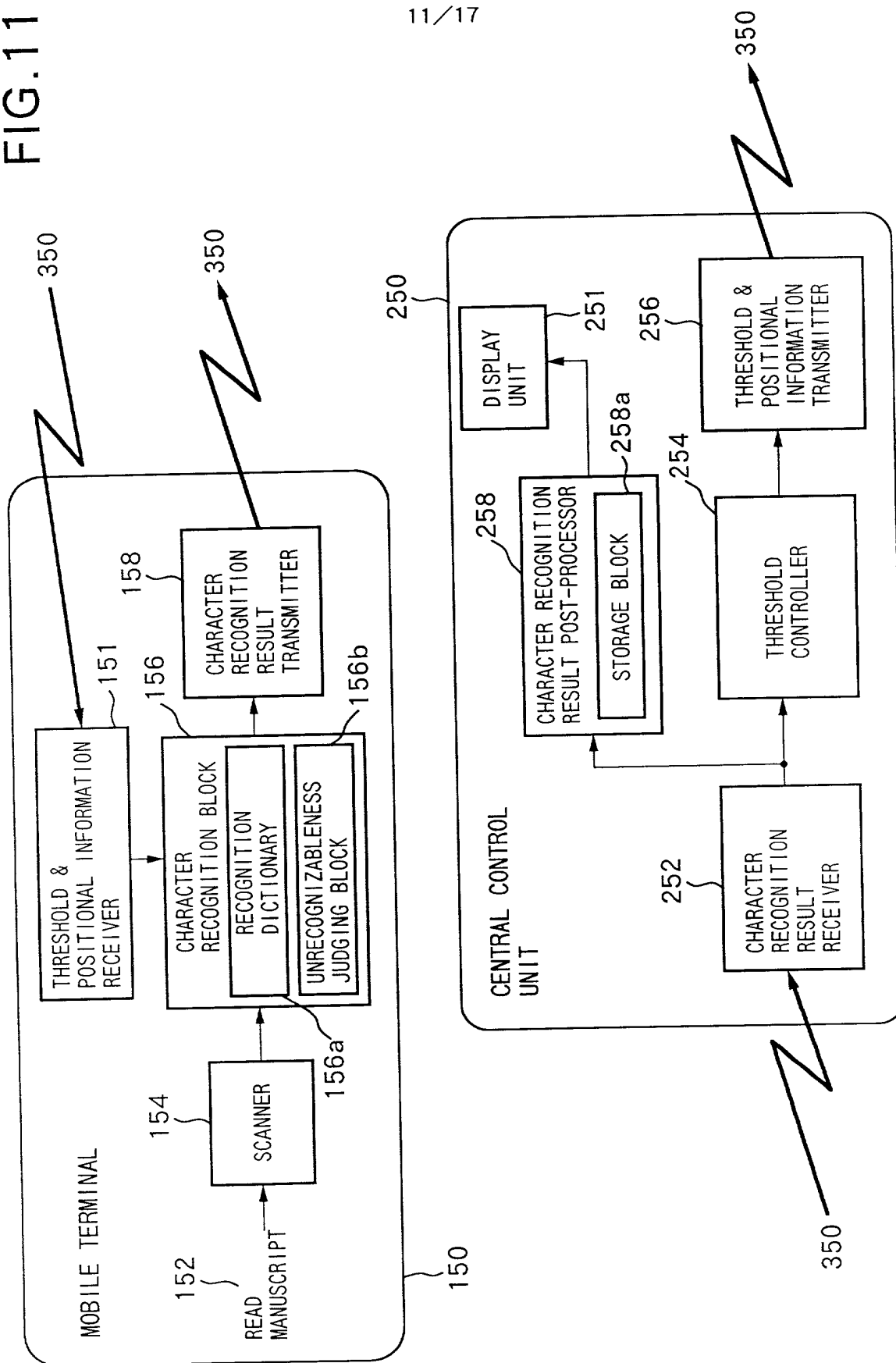


FIG.12

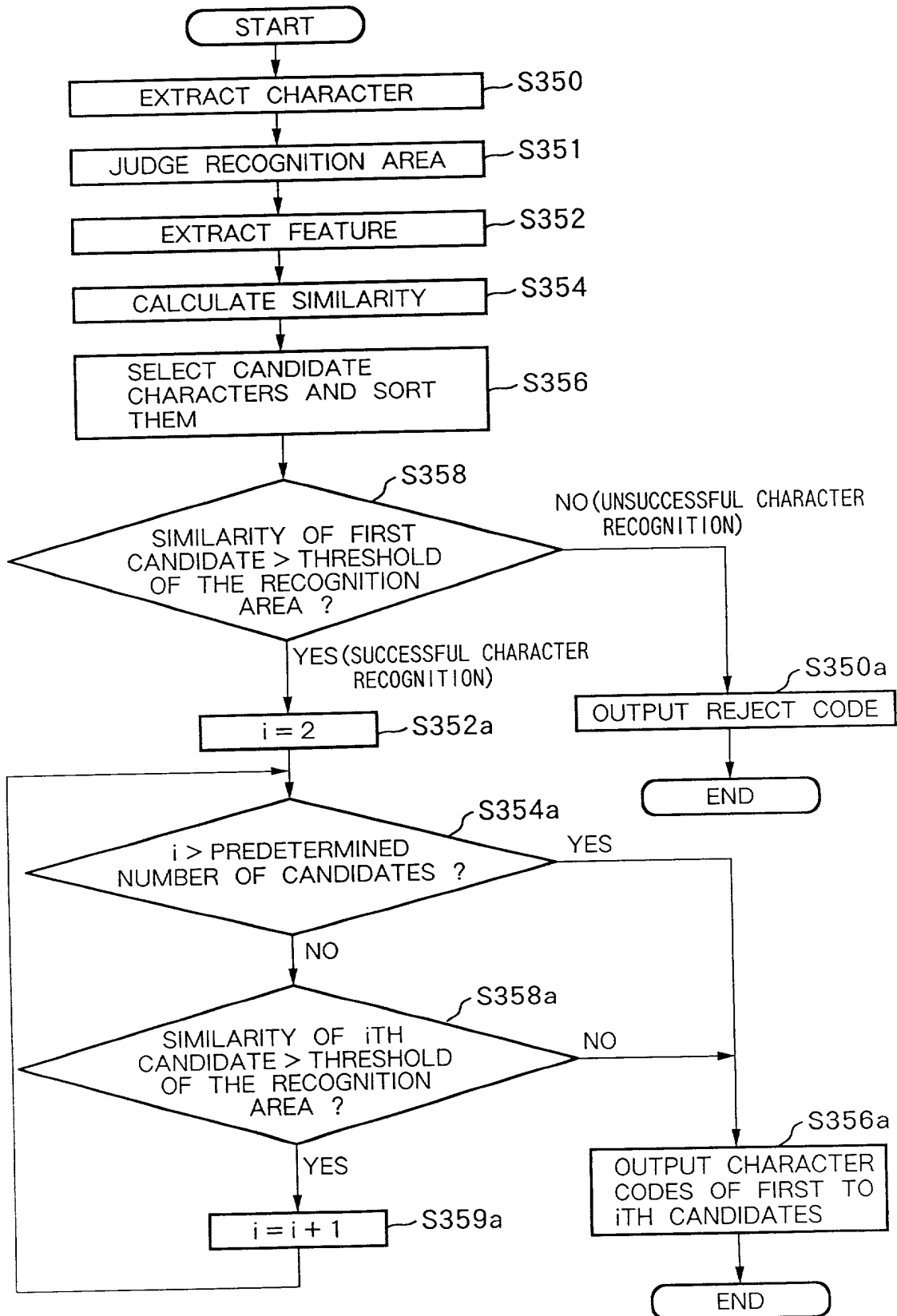


FIG.13

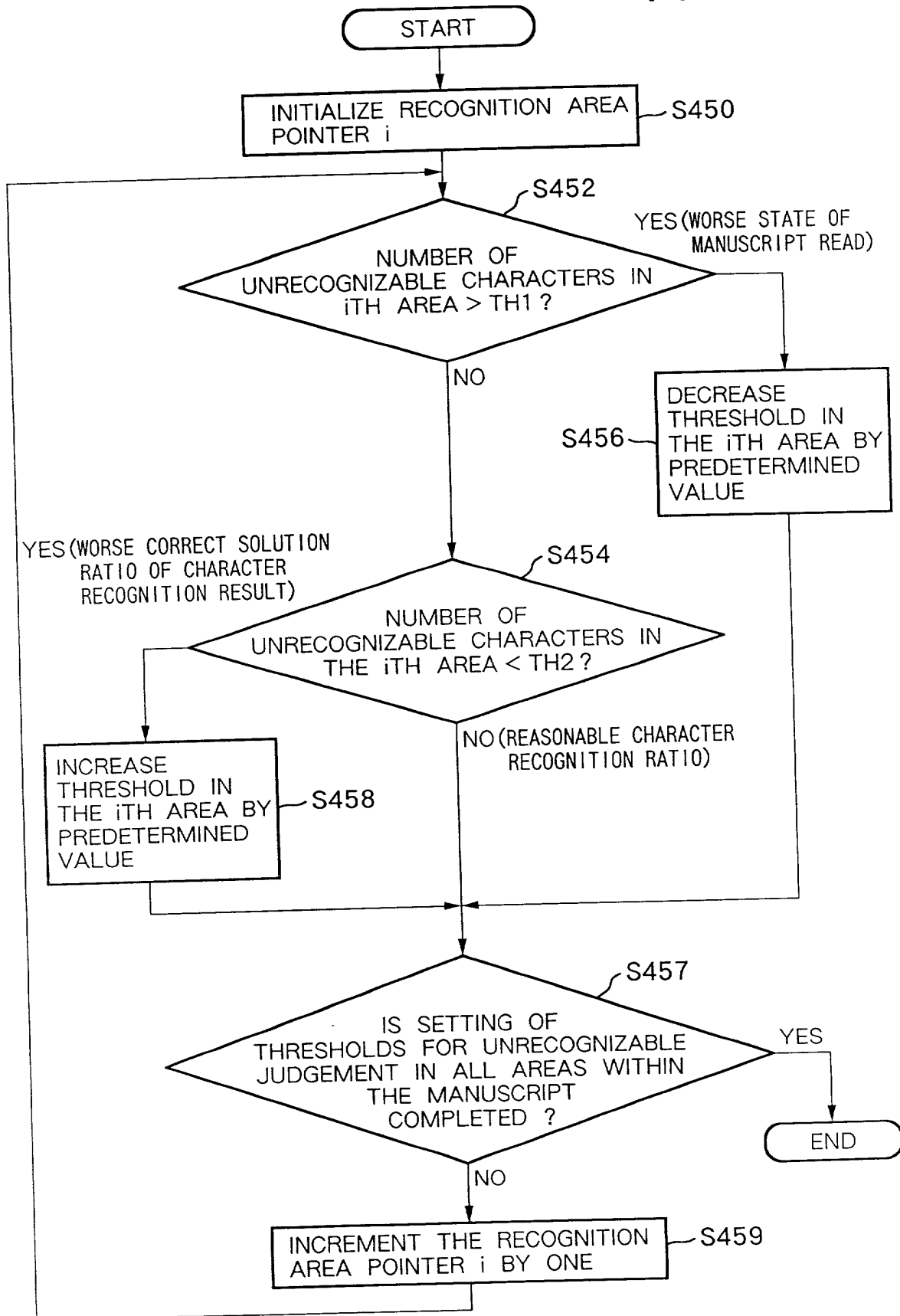


FIG. 14

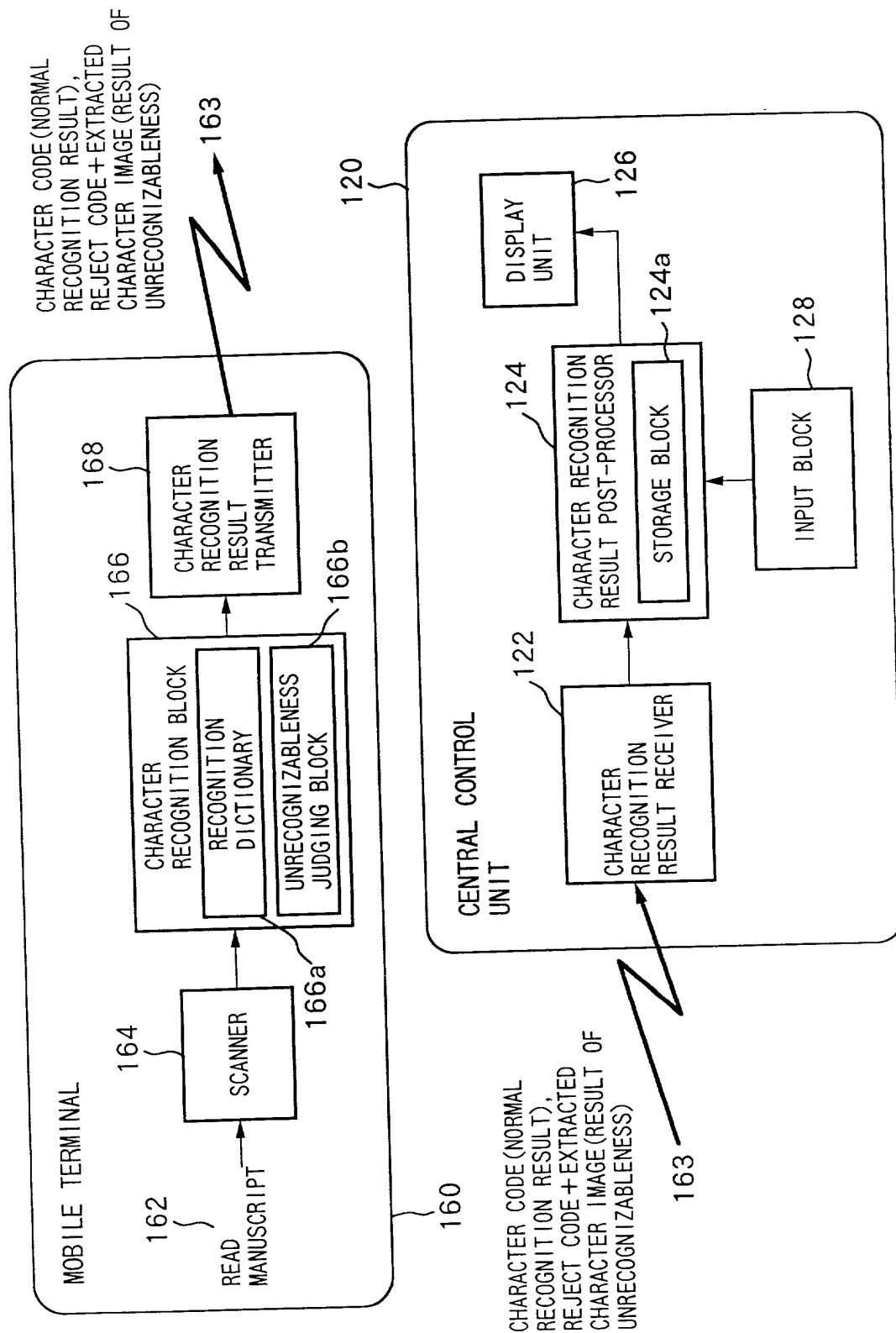


FIG.15

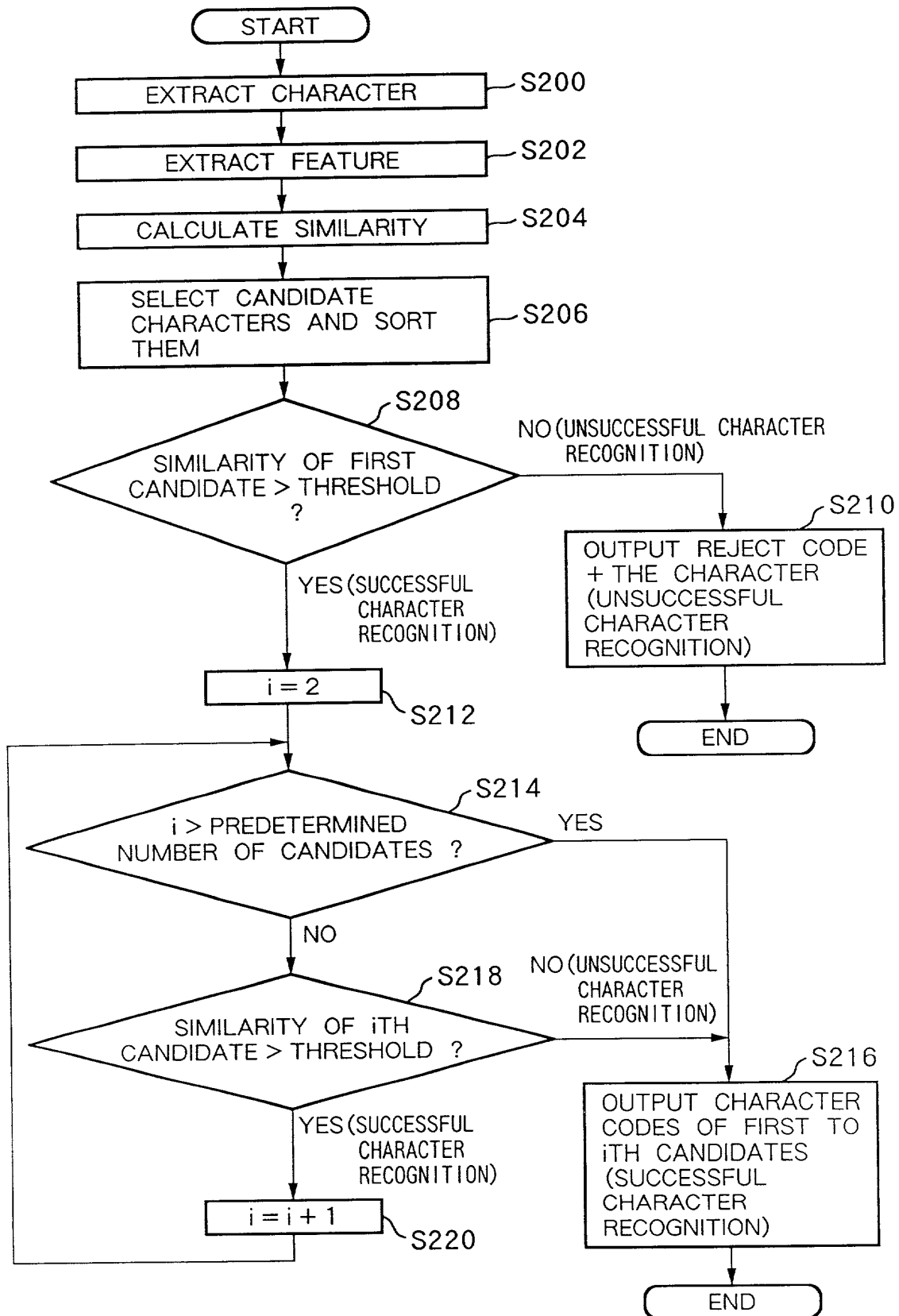


FIG. 16

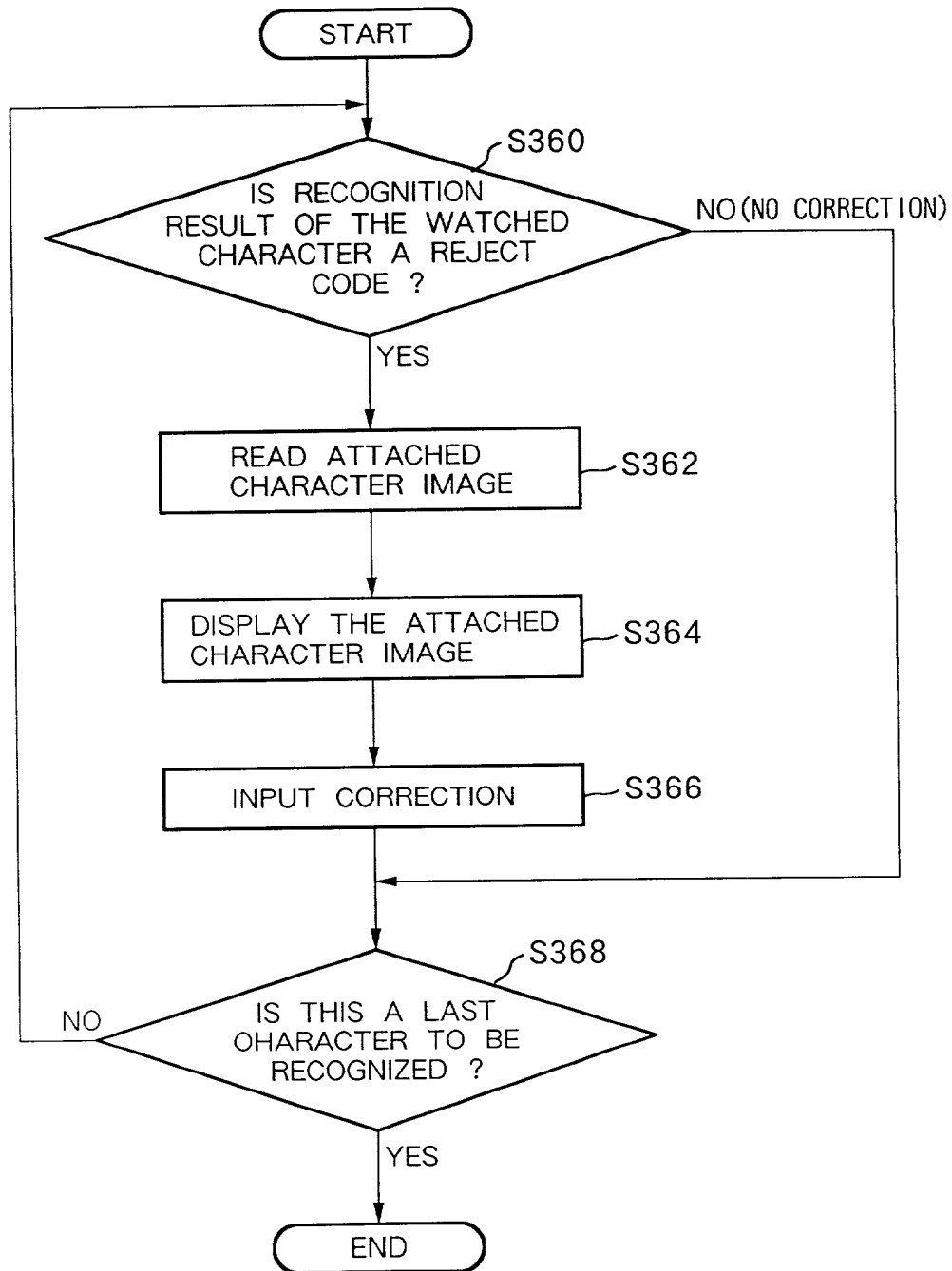
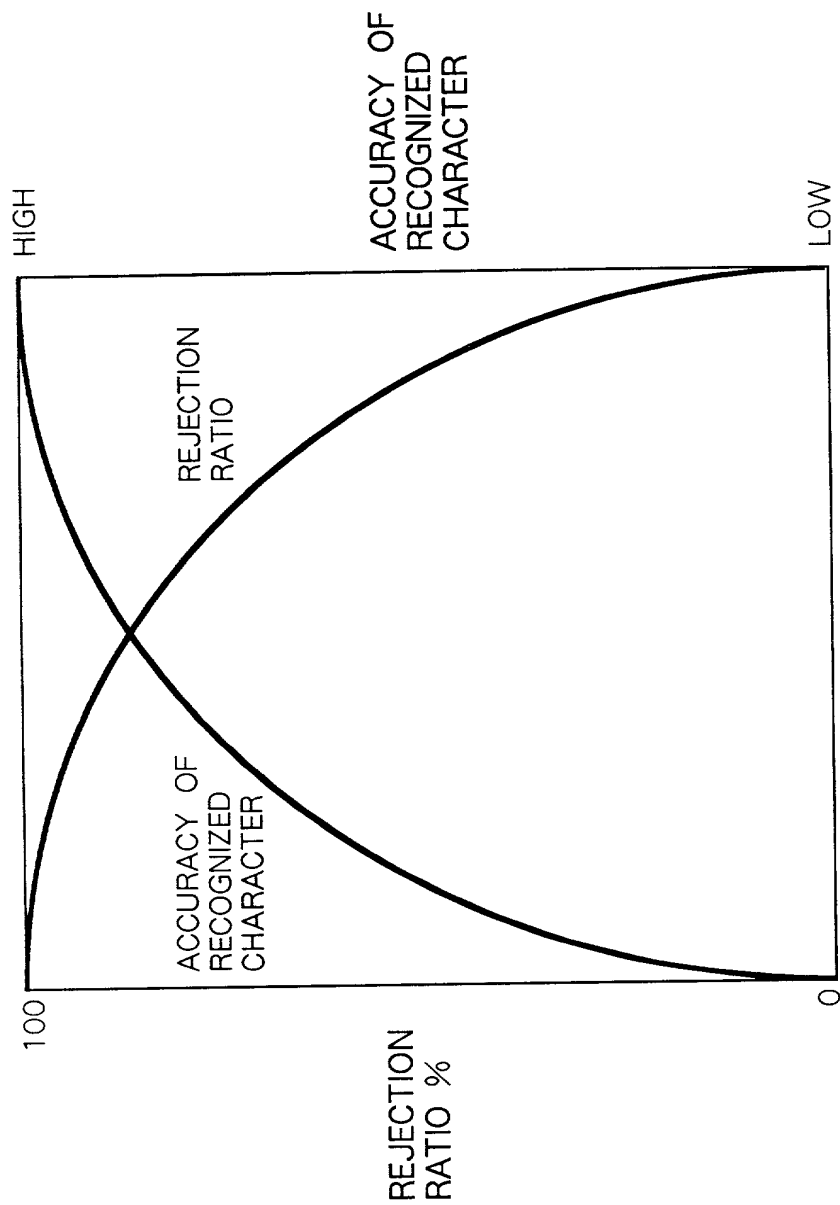


FIG.17



COMBINED DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION (Page 1)

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name;

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

COMMUNICATION SYSTEM AND CONTROL METHOD THEREOF, AND
COMPUTER-READABLE MEMORY

the specification of which [X] is attached hereto. [] was filed on _____

as United States Application No. or PCT International Application No. _____
and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR §1.56.

I hereby claim foreign priority benefits under 35 U.S.C. §119(a)-(d) or §365(b), of any foreign application(s) for patent or inventor's certificate, or §365(a) of any PCT international application which designates at least one country other than the United States, listed below and have also identified below any foreign application for patent or inventor's certificate, or PCT international application having a filing date before that of the application on which priority is claimed:

Country	Application No.	Filed (Day/Mo./Yr.)	(Yes/No) Priority Claimed
JAPAN	9-351710	19/12/1997	Yes
JAPAN	9-351711	19/12/1997	Yes
JAPAN	9-355761	24/12/1997	Yes
JAPAN	9-358518	25/12/1997	Yes
JAPAN	9-358519	25/12/1997	Yes
JAPAN	9-358520	25/12/1997	Yes

I hereby appoint the practitioners associated with the firm and customer number provided below to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith, and direct that all correspondence be addressed to the address associated with that Customer Number:

FITZPATRICK, CELLA, HARPER & SCINTO
Customer Number: 05514

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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